0-315-03551-X

National Library of Canada | Bibliothèque nationale du Canada

Canadian Theses Division | Division des thèses canadiennes

Ottawa, Canada
K1A 0N4

51446

PERMISSION TO MICROFILM — AUTORISATION DE MICROFILMER

- Please print or type — Écrire en lettres moulées ou dactylographier

Full Name of Author — Nom complet de l'auteur
John Peter Caldwell

Date of Birth — Date de naissance
Nov 29 1950

Country of Birth — Lieu de naissance
Canada

Permanent Address — Résidence fixe
RR# 2 Almonte
Ontario

Title of Thesis — Titre de la thèse
Hedging on the United states Futures Market By A Canadian Producer.

University — Université
University of Alberta

Degree for which thesis was presented — Grade pour lequel cette thèse fut présentée
Master of Science

Year this degree conferred — Année d'obtention de ce grade
Spring 1981

Name of Supervisor — Nom du directeur de thèse
Dr M. Hawkins

Permission is hereby granted to the NATIONAL LIBRARY OF CANADA to microfilm this thesis and to lend or sell copies of the film.

The author reserves other publication rights, and neither the thesis nor extensive extracts from it may be printed or otherwise reproduced without the author's written permission.

L'autorisation est, par la présente, accordée à la BIBLIOTHÈQUE NATIONALE DU CANADA de microfilmer cette thèse et de prêter ou de vendre des exemplaires du film.

L'auteur se réserve les autres droits de publication; ni la thèse ni de longs extraits de celle-ci ne doivent être imprimés ou autrement reproduits sans l'autorisation écrite de l'auteur.

Date
Dec 13 /80

Signature
J Caldwell

NL-91 (4/77)

National Library of Canada
Collections Development Branch

Canadian Theses on
Microfiche Service

Bibliothèque nationale du Canada
Direction du développement des collections

Service des thèses canadiennes
sur microfiche

NOTICE

The quality of this microfiche is heavily dependent upon the quality of the original thesis submitted for microfilming. Every effort has been made to ensure the highest quality of reproduction possible.

If pages are missing, contact the university which granted the degree.

Some pages may have indistinct print especially if the original pages were typed with a poor typewriter ribbon or if the university sent us a poor photocopy.

Previously copyrighted materials (journal articles, published tests, etc.) are not filmed.

Reproduction in full or in part of this film is governed by the Canadian Copyright Act, R.S.C. 1970, c. C-30. Please read the authorization forms which accompany this thesis.

THIS DISSERTATION
HAS BEEN MICROFILMED
EXACTLY AS RECEIVED

AVIS

La qualité de cette microfiche dépend grandement de la qualité de la thèse soumise au microfilmage. Nous avons tout fait pour assurer une qualité supérieure de reproduction.

S'il manque des pages, veuillez communiquer avec l'université qui a conféré le grade.

La qualité d'impression de certaines pages peut laisser à désirer, surtout si les pages originales ont été dactylographiées à l'aide d'un ruban usé ou si l'université nous a fait parvenir une photocopie de mauvaise qualité.

Les documents qui font déjà l'objet d'un droit d'auteur (articles de revue, examens publiés, etc.) ne sont pas microfilmés.

La reproduction, même partielle, de ce microfilm est soumise à la Loi canadienne sur le droit d'auteur, SRC 1970, c. C-30. Veuillez prendre connaissance des formules d'autorisation qui accompagnent cette thèse.

LA THÈSE A ÉTÉ
MICROFILMÉE TELLE QUE
NOUS L'AVONS REÇUE

Ottawa, Canada
K1A 0N4

NL-339 (Rev. 8/80)

THE UNIVERSITY OF ALBERTA

HEDGING ON THE UNITED STATES FUTURES MARKET BY A CANADIAN PRODUCER

by

© JOHN P. CALDWELL

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE

OF MASTER OF SCIENCE

IN

AGRICULTURAL ECONOMICS

DEPARTMENT OF RURAL ECONOMY

SPRING, 1981

The University of Alberta

Faculty of Graduate Studies and Research

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled "Hedging on the United States Futures Market by a Canadian Producer" in partial fulfilment of the requirements for the degree of Master of Science in Agricultural Economics.

Supervisor

Robert T. Hardin
Outside Examiner

September 30, 1980
Date.

ABSTRACT

This study examines the usefulness of the futures market in providing a solution to some of the recurring problems of the beef industry. In particular it examines the usefulness of hedging in increasing and stabilizing the levels of income to a feedlot operator.

This study is unique to Canada for two reasons:

(1) it involves the use of multi-hedging (hedging inputs and outputs).

(2) it involves hedging on the United States futures market by a Canadian producer.

A production model is used to provide estimates of producers returns during a selected period. Different hedging strategies are developed and their impact on producer returns are evaluated.

?

ACKNOWLEDGEMENTS

Preparation of this manuscript would have been very difficult without the assistance of a number of talented people. In particular, I wish to extend my thanks to Mr. J. Copeland, Miss E. Shapka, Mrs. W. Williamson, Mrs. P. Lowrey, Mr. B. Sonnetag of Agriculture Canada, and Mr. J. Sadnicki of United Grain Growers. I would also like to express my appreciation to Agriculture Canada who provided financial assistance for this research.

The assistance provided by my professors, fellow students, and associates is acknowledged and appreciated. In particular I wish to thank Dr. M. Hawkins for his assistance and encouragement. And finally and most of all I wish to thank my parents, and my brother for, without their assistance and support, I would not be where I am today.

I would like to dedicate this thesis to my grandfather JOHN C. CALDWELL who, unfortunately, died before seeing his name-sake graduate from University. "May his spirit live on in future generations."

TABLE OF CONTENTS

CHAPTER PAGE

I INTRODUCTION 1

- Purpose of This Study 2
- Objectives of This Study 2
- Hypothesis 2
- Methodology 3
- Data and Time Period Covered 3
- Organization of the Thesis 3
- A Note to the Reader 4

II MECHANICS OF FUTURE MARKETS 5

- The Futures Contract 5
- Participants in a Futures Market 6
- Placing an Order 6
- Margin Requirements 7
- Long and Short Position 7
- Contracts Used in This Thesis 8
- Hedging 9

III REVIEW OF LITERATURE 11

- History of Futures Trading 11
- Why Hedge 13
- Hedging Redefined 15
- Hedging in This Study 17
- Previous Studies 18
- Other Studies 25

IV THE CONCEPT OF BASIS 28

- The Basis for Storable Commodities 28
- The Basis for Nonstorable Commodities 31
- A Declining Basis 34
- An Increasing Basis 36
- Termination of a Contract 37
- The Calgary Basis for Cattle 38
- The Calgary Basis for Barley 40
- The Effect of the Exchange Rate 42

V COST OF PRODUCTION MODEL 45

- Placement and Lifting of Hedges 48
- Problems in the Data 52

CHAPTER PAGE

VI METHODOLOGY AND RESULTS 54

- Hedging Strategies 54
- Naive Strategies 55
- Selectice Strategies 56
- Method of Analysis 57
- Results of Hedging Strategies 61
- Analysis of Basis for Hedges 65
- Analysis of Basis by Contract Month 70

VII CONCLUSIONS, RECOMMENDATIONS AND SUMMARY 78

- Conclusions 78
- Contract Specifications 81
- Government Intervention 82
- A Note of Warning 83
- Financial Requirements 84
- Bias in the Future's Market 84
- Bias in This Study 84
- Recommendations for Further Studies 85
- Summary 86

* * *

BIBLIOGRAPHY 87

APPENDIX A 95

APPENDIX B 108

APPENDIX C 111

VITA 115

LIST OF TABLES

Table	Description	Page
2.1	Margin Requirements for Contracts used in this study	8
3.1	Average Profits, Per Head, From 7 Alternative Cattle Hedging and Contracting Programs, May 1965 - December 1974 - Study by McCoy and Price.	23
6.1	Results of Hedging Strategies	62
6.2	Calgary Basis Chicago Live Cattle by Contract Month	74
6.3	Calgary Basis Chicago Feeder Cattle by Contract Month	76
6.4	Calgary Basis Chicago Corn Futures by Contract Month.	77

LIST OF FIGURES

Figure		Page
3.1	The Expected Return Versus the Risk of Holding Unhedged Stocks.	16
3.2	Average Returns and Price Variation of Twelve Selective Hedging Strategies - Study by Martin, Groenwegen and Meilke	21
4.1	Relationship Between Futures and Cash Price at a Par Delivery Point for a Storable Commodity	32
5.1	Feedlot Simulation Model Flowchart	46
5.2	Placement of Hedges Flowchart.	50
6.1	Analysis of Returns	58
6.2	Evaluating the Hedging of an Input	60
6.3	Results of Hedging Strategies in this study	63
6.4	Calgary Basis Chicago Live Cattle	66
6.5	Profit or Loss on Live Cattle Hedge	67
6.6	Calgary Basis Chicago Feeder Cattle	68
6.7	Profit or Loss on Feeder Cattle Hedge	69
6.8	Calgary Basis Chicago Corn Futures	71
6.9	Profit or Loss on Corn Futures Hedge	72
6.10	Canadian U.S. Dollar Exchange Rate	73

CHAPTER 1

INTRODUCTION

The beef industry has made substantial contributions to the agricultural sector of the Canadian economy. In 1976 cattle and calves accounted for 19.7 per cent[1] of total farm cash receipts. Of this percentage, Alberta contributed 31.3 per cent[2]. It is desirable, particularly in the case of Alberta, to ensure the continued strength of this industry.

In recent years, the future of this industry has been seriously jeopardized. In a submission to the Senate Standing Committee on Agriculture, the Canadian Federation of Agriculture stated, "This situation of a high cattle inventory and a high level of marketing together with high production levels has put pressure on cattle prices in recent years and resulted in contraction of the industry".[3]

In the same brief the Federation indicated a need for stability within the industry at levels which ensure a fair return to producers for their labor and capital investment. In particular they stated that "Producers have looked to a national cow-calf support program to provide support and stability for their industry and for cow-calf producers who have been and are experiencing serious losses".[4]

---

[1] Statistics Canada Catalogue 21-001, Farm Cash Receipts, Dec. 1976, P.15

[2] Ibid p.13

[3] Canadian Federation of Agriculture, "Submission on the Senate Standing Committee on Agriculture on Beef Stabilization." p.3

[4] Ibid p.1

Purpose of This Study

The purpose of this study is to examine the usefulness of futures contracts in increasing the mean level of producer income while, at the same time, achieving some degree of stability in producer income for Alberta feedlots. It is hoped that by introducing some degree of stability at the feedlot level, the future of the industry may be ensured to some degree.

Objectives of This Study

The objectives of this study are:

(1) To explain the mechanics of hedging for a beef producer with the following futures contracts:
   a. Chicago live cattle
   b. Chicago feeder cattle
   c. Chicago corn

(2) To analyze the relationship between the futures contracts listed above and their respective Calgary cash prices:
   a. Calgary A1, A2 steers
   b. Calgary feeder cattle 600 - 700 lbs.
   c. Calgary feed barley

(3) To develop several hedging strategies involving the futures contracts listed above and to evaluate their effects on producer income for a Calgary feedlot in terms of level and stability.

Hypothesis

It is postulated that the results of this study will indicate that an Alberta feedlot operator can increase the level and the stability of his income through the effective use of futures markets.

Methodology

The research involved in this study is divided into two distinct parts, each of which is aimed at achieving one of the objectives stated at the outset of this study. The first portion of this research is aimed at examining the relationship between the Calgary cash price and the Chicago futures price for those commodities previously listed. This research involves the examination of the factors affecting the Calgary basis and the actual basis over a period of time for the contracts used in this study.

The second part of this analysis requires the development of specified hedging strategies for each of the previously noted contracts. In order to evaluate the performance of these strategies, cost of production estimates and the resulting producer income are derived over a specified time period.

Data and Time Period Covered

Data for the period September 1, 1975 to September 1978 was obtained from the following sources: Statistics Canada, Canada Department of Agriculture, United Grain Growers' Limited, the Chicago Board of Trade Yearbook, and the Chicago Mercantile Yearbook.

Organization of the Thesis

This thesis is organized into seven chapters, the contents of which are as follows:

(1) Chapter II describes the mechanics of hedging.

(2) Chapter III reviews previous work done in this area.

(3) Chapter IV discusses the concept of basis and examines the factors which affect the Calgary basis for the commodities examined in this study.

(4) Chapter V describes the model used to derive estimates of producer income.

(5) Chapter VI outlines the strategies which are used and the results of each strategy, and provides the results of the analysis of the Calgary basis for each of the commodities examined in this study.

(6) Chapter VII provides a summary of this study, the conclusions deduced, and it gives some recommendations for further work in this area.

A Note to the Reader

There are a number of terms used in futures trading with which the reader of this thesis may not be familiar. Therefore, in order to assist the reader in his understanding of this subject, a dictionary of terms commonly used in futures trading has been included in Appendix A.

CHAPTER II

MECHANICS OF FUTURE MARKETS

A necessary prerequisite for participation in the futures market is a knowledge of the market and how it operates. It is not the purpose of this thesis to give a detailed description of the futures markets. Those readers who are either unfamiliar with, or interested in the concepts discussed here, are referred to a more appropriate source.[1]

The Futures Contracts

The futures contract is a contractual agreement, enforceable by law[2], to buy or sell a specified quantity and quality[3] of a commodity. This is a fundamental concept in understanding futures, for it is not the actual purchase or sale of a commodity, but a written promise to buy or sell at a predetermined price and at a particular time and place.[4] Thus, in the case of futures trading, ownership or possession of the particular commodity is not a prerequisite to trading.[5]

---

[1] For a more detailed discussion see: Hieronymous, T.A., Economics of Futures Trading for Commerical and Personal Profit. New York, N.Y. Commodity Research Bureau Inc., 1971

[2] In Canada Futures Contracts come under the Grain Futures Act, whereas in the U.S. they are covered by the Commodity Futures Trading Act.

[3] Lesser grades may be allowed under the terms of the contract at the appropriate discount.

[4] The terms of the contract designate the points of delivery (par delivery points). Other points may be allowed at a slight discount (non-par delivery points).

[5] G.G. Storey and L. Martin, "A Preliminary Paper on the Role and Importance of Futures Markets to Canadian Agriculture.": Food Prices Review Board Reference Paper, No 1, p 3.10, 3.11

Although contracts may vary to some degree between commodities, they are identical for each particular commodity with regard to terms, except for the delivery month and the price. The months for which contracts are offered are fixed by the exchange, as is the delivery date within the contract month. The only negotiation which occurs involves the price, and the number of contracts which determines the quantity involved. The actual trading is highly formalized. To ensure competition, trading takes place in an open pit by public outcry. The rules of trading are detailed and strictly enforced by the exchanges involved.

Participants in a Futures Market

There are two basic groups involved in futures trading, the hedgers and the speculators. The hedger is a person or firm which has a vested interest in the ownership of the actual commodity, and wishes to eliminate or reduce the inherent risk of price change. These individuals or firms may be producers of the commodity (eg. farmers), middlement (eg. grain traders), or actual users of the commodity (eg. flour mills).

The speculator, on the other hand, does not, as a general rule, become involved in the ownership of the commodity. He seldom, if ever, accepts delivery of the commodity, but closes out his contracts before trading is suspended for that particular contract month.

Placing an Order

The method of placing and executing trading orders is the same for both hedgers and speculators. The initial step is to open an account with a local commodity broker. To open an account basically involves providing pertinent details (name, age, address, etc.) and signing an agreement to cover losses incurred in the trading of commodities. After the individual has opened an account the broker firm would then require a margin deposit. The individual is then in a position to begin trading in commodities.

Margin Requirements

Margin deposits are required by the exchange as security against an adverse change in the price of the commodity. Such margin requirements are best explained by an example. Let us assume that someone wishes to trade in corn on the Chicago Board of Trade. This individual would place an order with his broker, with whom he has an account, to buy one September corn contract, which is 5,000 bushels. In this particular case the broker removes a margin deposit of $500.00. The margin deposit is composed of $500.00 initial margin and $0.00 maintenance margins.[6] This margin deposit is not a fee charged by the broker, but rather, working capital fund from which losses may be deducted to protect the brokerage firms and the exchanges. In the event of an adverse price change the trader would be required to increase his margin by the full amount of the change in the value of the contract (change x 5,000 bu) if this change is greater than the maintenance margin. Thus the $500.00 is also referred to as the call point, and any adverse price change greater than the maintenance margin requires additional money deposited as margin on the contract.

Long and Short Position

The different positions held by a trader in the commodity market are referred to as long and short. When a trader sells a contract he is committed to making future delivery in that commodity, and his position is described as short futures. On the other hand, if the trader buys a contract he is committed to accepting delivery of the commodity, and this position is known as long futures. The distinction between these two positions is important because a rise in price is an adverse price change in a short position; whereas in a long position such a rise is a favourable price change. On the other hand, a price decline is a favourable price change in a short position, and an adverse price change in a long position.

---

[6] The amount varies between commodity contracts.

Contracts Used in This Thesis

Three contracts are used in this thesis: the corn contract traded on the Chicago Board of Trade, the live beef cattle contract traded on the Chicago Mercantile Exchange, and the feeder cattle contract traded on the Chicago Mercantile Exchange. The contract specifications for each of these commodity contracts are listed in Appendix B. The margin requirements for these same contracts are listed in Table 2.1.

TABLE 2.1

MARGIN REQUIREMENTS FOR CONTRACTS USED IN THIS STUDY

Contract	Total Margin	Initial Margin Hedgers	Maintenance Margin	Call Point
Live Beef Cattle	1200	900	300	900
Feeder Cattle	1500	1200	300	1200
Chicago Board of Trade: Corn	500	500	0	500

Source: Richardson Securities of Canda, Edmonton, Alberta, August, 1980

Hedging

As indicated, participants in the futures market who hedge are referred to as hedgers, and are interested in reducing or eliminating risk due to price change. Thus the essence of a hedge is the reduction of the risk due to price change or, in fact, to "lock in" a price. There are two types of hedges: a buying hedge, and a selling hedge. A buying hedge means that the hedger will need the commodity in the future, and that he wishes to protect himself against a possible increase in the price of the commodity; thus, he would buy future contracts. A selling hedge, on the other hand, means that the hedger will be selling the commodity in the future and wishes to protect himself against a future decline in the price; thus, he would sell future contracts.

To explain the actual mechanics involved let us look at an example. Suppose a farmer places 202 head of feeder cattle on feed in April, and plans to market them at 1,000 pounds in August. He would expect a 1 percent mortality rate. Thus, he would expect to market 200,000 pounds of live cattle in August. In April the Calgary cash price of A1, A2 steers is $40.00 per cwt. whereas August futures are trading at $43.00 U.S. per cwt. in Chicago. If the producer wishes to hedge his cattle he would sell 5 August contracts. Let us assume that by August the Calgary cash price has fallen to $38.00 per cwt. and that August futures are trading at U.S. $41.00 per cwt. Assuming the U.S. Canadian exchange rate is at par, the producer would sell his cattle in Calgary at $38.00 per cwt., and net a profit of $2.00 per cwt. (less commission and interest on margin) on his futures contract. The producer does, in fact, obtain a price of $40.00 per cwt. for his cattle (again less commission and interest charges). Thus the producer locked in a price of $40.00 per cwt.

There is also another possibility in the foregoing example. Suppose that the Calgary cash price was $42.00 per cwt. and the Chicago futures price was $45.00 U.S. per cwt. in August. Then, given the same assumptions about the exchange rates, the producer would sell his cattle for $42.00 per cwt. and lose $2.00 per cwt. (plus interest and commission) on his futures transaction. This would yield a net price to the producer of $40.00 per cwt. (less interest and commission).

The above examples are "perfect hedges" in so far as the change in the futures price and cash price were equal. In reality this seldom happens; thus the hedger cannot lock in an exact price. Let us assume in the example above, that in August the Calgary cash price was $42.00 per cwt. and the Chicago futures price was $46.00 U.S. per cwt. In this particular case the producer would sell his cattle for $42.00 per cwt. and lose $3.00 per cwt. on his futures transaction, yielding a net price of $39.00 per cwt. (less interest commission) which is $1.00 per cwt. less than the locked in price.

These particular examples demonstrate how a producer hedges a product he wishes to sell at some future date. In the case that he wishes to buy some commodity, say feeder cattle, at a future date, he would buy the desired quantity of futures contracts.

CHAPTER III

REVIEW OF LITERATURE

History of Futures Trading

Forward trading of commodities is virtually as old as commerce itself. Markets organized for the conduct of futures trading, however, have become prominent only during the past century.[1] Futures trading originally grew out of the merchandising trade already in existence. Merchants, grain dealers, and millers organized the market to better facilitate the trading in which they engaged by providing a common focal point for those involved in this trading. The result was that the futures market complemented existing trading by providing a gathering house for any information which affected price changes. Traders were, thus, enabled to establish prices for a commodity at a future date.

Hedging, in the form which we know it, was probably initiated by a merchant-warehouseman whose function was essentially to store commodities for later resale. An example of this concept was the egg futures market which "first emerged as an inventory hedging market par excellence".[2] It was originally the practice of assemblers who placed eggs in cold storage during the high production period of spring for later resale during the deficit period of the fall, to hedge their investment with futures contracts purchased by speculators.[3] As seasonal production in the industry was transformed to uniform production over the whole year, however, the need for the hedger of inventory was eliminated. Consequently, a fresh egg futures contract was introduced to serve the role of a forward price hedge. Thus, historically different types of hedgers have evolved, depending on their personal needs.

---

[1] Gray, R.W., Rutledge, J.S., "The Economics of Commodity Futures Markets: A Survey," Review of Marketing and Agricultural Economics, Vol. 39, No. 4 (Dec. 1971), pg. 58.

[2] Ibid., p.60

T.A. Hieronymus[4] lists three users of futures markets who, because of their individual situations, can be classified as different types of hedgers:

(1) Inventory hedgers are those people who have on hand the physical product and are planning to sell it at some future date. They hedge to protect themselves against an adverse price change. An example of this type would be a grain trader.

(2) Operational hedgers are those people who require the product at some future date. In anticipation of their needs, they repurchase the product by way of futures contract. An example of this type of hedger is a flour miller.

(3) Forward Price Hedgers are those people who are incurring certain costs at the present time in the production of a commodity. They wish to protect themselves against an adverse price change in the future. An example of this type of hedger is a grain farmer.

---

[3] Gray, R.W., Rutledge, J.S., "The Economics of Commodity Futures Markets: A Survey," Review of Marketing and Agricultural Economics, Vol. 39, No. 4 (Dec. 1971), p.58.

[4] Hieronymus, T.A. Economics of Futures Trading for Commercial and Personal Profit. New York, New York: Commodity Research Bureau Inc., 1971

Futures trading in live cattle first occurred in 1964, and has since generated substantial activity. The inception of this contract was not well received because its early demise was predicted by Skadberg and Futrell.[5] They predicted its demise on the basis that "futures market in live cattle does not offer significant hedging or pricing potential at this time".[6] It should be noted at this point that there appears to be a disagreement on the interpretation of this article. A study conducted by Martin, Groenewegen and Meilke[7] at the University of Guelph attributes Skadberg and Futrell with the prediction that the demise would be on the grounds that live cattle are not storable. Upon reviewing the article, this writer is forced to take exception with this interpretation. Regardless of interpreation, the fact that the live cattle contract has successfully traded for some fifteen years may be taken as an indication that Skadberg and Futrell were incorrect in their prediction of its demise in the United States.

Why Hedge

Current literature appears to be rather ambiguous in its interpretation of why people hedge. Three theories are taken from a paper by Quantz and Hawkins,[8] one of which is expanded on. The first theory which is offered is that, "hedging is performed to eliminate risk".[9] The second theory is that "hedging reduces risks associated with price change and therefore the futures market is useful only to the extent that it provides the best risk reducing alternative available".[10] Neither of these two theories adequately explains the case in which a hedger uses an imperfect hedge or in which the basis is subject to change. The third theory is that "hedgers improve the sophistication of their operations and find predictable bias in the basis allowing them to reduce the risk of an adverse basis change and improve the profitability of hedging".[11] It is on this third theory that this study is based and which will be explored further.

---

[5] Skadberg, J.M., and Futrell, G.A., "An Economic Appraisal of Futures Trading in Livestock", Journal of Farm Economics, Vol. 48, (Dec., 1966), p. 1485-1489.

[6] Ibid., p. 1485-1486.

[7] Martin, L., Groenewegen, J., and Meilke, Kl, "Commodity Futures Markets Hedging Opportunities for Ontario Pork Producers," School of Agricultural Economics and Extension, Education University of Guelph, 1974, p. 11

This theory was first presented by Holbrook Working in 1953[12] and was expanded on by Stein in 1961.[13] Stein expresses the desire to hedge in terms of utility theory. It is his contention that indifference curves can be used to denote the equal utility given by varying the amount of hedged and unhedged stocks. The indifference curve between return and risk will be convex -- rising at an increasing rate -- if the individual has a declining marginal utility of income and a total utility which can be approximated by a quadratic.[14] An example of such a case is shown in Figure 3-1 and is depicted by the line 1_0.

---

[8] Quantz, L., Hawkins, M., "Futures Trading a Review", Canadian Journal of Agricultural Economics, Vol. 22, No. 2, (July, 1974,), P.48-53

[9] Ibid., p.51

[10] Ibid., p.51

[11] Ibid., p.52

[12] Holbrook, Working,"Futures Trading and Hedging," Selected Writings of Holbrook Working, Edited by A. Peck, Chicago Illinois: Chicago Board of Trade, 1977, p. 163.

In Figure 3-1, risk is measured by the amount of unhedged stocks held, T being the point where stocks are 100 percent unhedged. Curve 1_2 is preferred to curve 1_1 because utility is greater along curve 1_2 than along curve 1_1. Point P represents the optimum combination of hedged (AT) and unhedged (OA) stocks given opportunity locus HU and the indifference map, since expected utility is maximized. In the event that the price of a futures contract rises, making hedged stocks more attractive, then the expected return from hedged stocks rises to H^1 yielding a new opportunity locus H^1U. As the slope of the line H^1U changes from HR, a substitution effect occurs, resulting in a new equilibrium combination of hedged and unhedged stocks (Q). This new equilibrium will result in the ratio of unhedged stocks to hedged stocks decreasing, such that OB of unhedged stocks and BT of hedged stocks will be held.

In Figure 3-1, it is assumed that unhedged stocks are both riskier and carry a higher expected return than hedged. There is no reason why line HU can not be negatively sloped; thus, only hedged stocks would be carried. This is especially the case when the expected return from hedged stocks would be greater than the expected return from unhedged stocks.

Hedging Redefined

In Chapter II, we defined a hedger as a "person or firm which has a vested interest in the ownership of the actual commodity and

---

[14] Ibid., p.1015

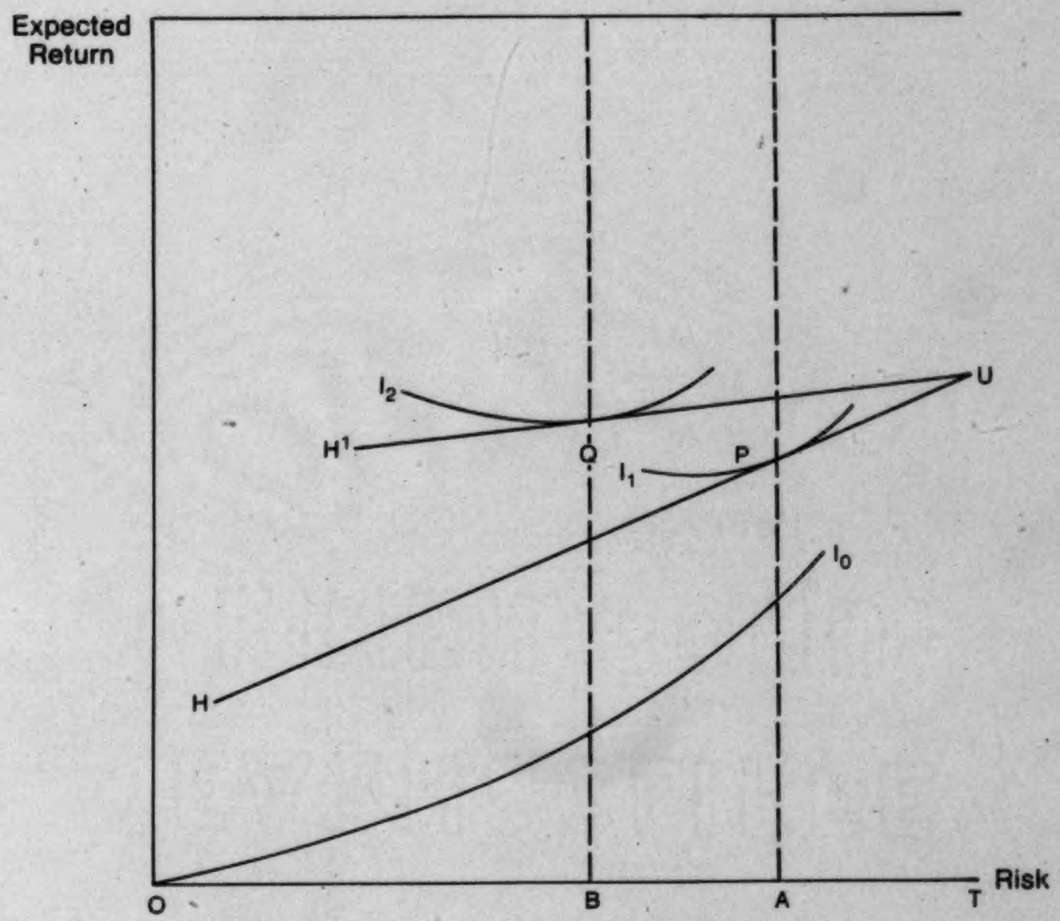

Expected Return
Risk
O
B
A
T
H
H^1
U
Q
P
I_0
I_1
I_2

Figure 3-1. The Expected Return Versus the Risk of Holding Unhedged Stocks. Source: Stein, J.L., "The Simultaneous Determination of Spot and Futures Prices", American Economic Review, Dec. 1961, p.1015.

wishes to eliminate or reduce the inherent risk of price change". Quite clearly, on the basis of the foregoing discussion, this definition does not adequately define a hedger or the act of hedging.

The act of hedging as defined by Working is making "a contract to buy or sell on standard terms established and supervised by a commodity exchange, as a temporary substitute for an intended later contract to buy or sell in other terms".[15] He says that hedging is performed for four different reasons:

(1) It facilitates buying ans selling decisions:[16] When hedging is practiced systematically there is need only to consider whether the price at which a particular purchase or sale can be made is favourable in relation to other current prices; there is no need to consider also whether the absolute level of price is favourable.

(2) It gives greater freedom of business action:[17] Hedging allows transactions to occur even when a particular grade is not available.

(3) It gives a reliable basis for conducting storage of commodity surpluses:[18] Hedging allows the storage of seasonal production without fear of an adverse price change.

(4) It reduced business risk:[19] There is a reduction in risk if hedging is done for any one of the foregoing reasons.

Hedging in This Study

The intent of this study is to derive a sequence of optimal hedging strategies that could have been adopted by a producer during the period under study. The strategies must be based upon information that was available at the time that the decision on hedging was made.

---

[15] Working, Holbrook, op.cit., p. 137

[16] Ibid., p.137

[17] Ibid., p.137

[18] Ibid., p.138

[19] Ibid., p.138

Previous Studies

Several studies have previously examined the profitability of hedging live cattle and live hogs. In each of these studies, different strategies were developed on the basis of information available at the time that the initial decision of hedging was made. The results were compared and evaluated to determine the effect that the various strategies had on producers returns. We will discuss three of these studies and evaluate their findings in terms of thie study.

A study by Martin, Groenewegen, and Meilke[20] at the University of Guelph, evaluated the effects of hedging, in terms of price fluctuation and increased returns of an Ontario pork producer hedging on the Chicago live hog contract. The study simulated the placing of hedges during a 312 week period (Jan. 1969 - Dec. 1974). The producer placed weanling pigs on feed for a period of 12 weeks and then sold them on the open market. Twelve different hedging strategies were studied and evaluated in terms of the average price received and the variation from the expected price.

The following is a summary of the twelve strategies employed in the study:

Strategy 1 (Pure Cash): No use of hedging was made in this strategy. This strategy was used as the benchmark to evaluate the other strategies tested.

---

[20] Martin, Groenewegen, and Meilke, op.cit.,

Strategy II (Full Hedge): This strategy employed a hedge in every feeding period.

Strategy III ($0.50 basis): This strategy employed a hedge only in those cases where the initial Toronto basis[21] is less than $0.50. This strategy assumed that the basis will, in all likelihood, increase, thus benefitting the producer.

Strategy IV ($0.00 basis): This strategy was the same as number III; in this strategy however, a hedge was employed only in those cases where the initial Toronto basis was less than zero.

Strategy V (-$0.50 basis): This strategy was the same as number III; in this strategy, however, a hedge is employed only in those cases where the initial Toronto basis was less than -$0.50.

Strategy VI (-$1.00 basis): A hedge was employed only in those cases where the initial Toronto basis was less than -$1.00.

Strategy VII (-$1.50 basis): A hedge was employed only in those cases where the initial Toronto basis was less than -$1.50.

Strategy VIII (-$2.00 basis): A hedge was employed only in those cases where the initial Toronto basis was less than -$2.00.

Strategy IX (-$2.50 basis): A hedge was employed only in those cases where the initial Toronto basis was less than -$2.50.

Strategy X (-$3.00 basis): A hedge was employed only in those cases where the initial Toronto basis was less then -$3.00.

Strategy XI (-$3.50 basis): A hedge was employed only in those cases where the initial Toronto basis was less then -$3.50.

Strategy XII (-$4.00 basis): A hedge was employed only in those cases where the initial Toronto basis was less than -$4.00.

---

[21] Basis in this study is defined as Toronto cash market price minus Chicago live hogs futures price in Canadian dollars.

The results of these strategies are given in Figure 3-2.

The results of this study indicated that all of the strategies tested afforded the producers a better chance to predict the price, and thus reduce the risk of an adverse price change. Strategy II (full hedge) provided the greatest protection against an adverse price change insofar as it minimized the variation from the expected price. The reduction in risk occurred, however, at the greatest cost because of the resultant lower average market price for the period. The remaining ten strategies (III-XII) resulted in a reduced variation of expected returns and, at the same time, resulted in a higher average price than in Strategy I. Thus, the results of the study would indicate that hog producers by employing selective hedging strategies can increase average returns, and at the same time, better predict the returns.

McCoy and Price [22] analyzed the effect of seven hedging strategies on profits for a Kansas feedlot operator during the period May 1965 to Dec. 1974. They used a simulation of a feedlot which included the purchasing of feeder cattle, feeding, and marketing the finished cattle to estimate the average net return per head. Seven hedging strategies were evaluated using 505 lots of cattle. The seven strategies are as follows:

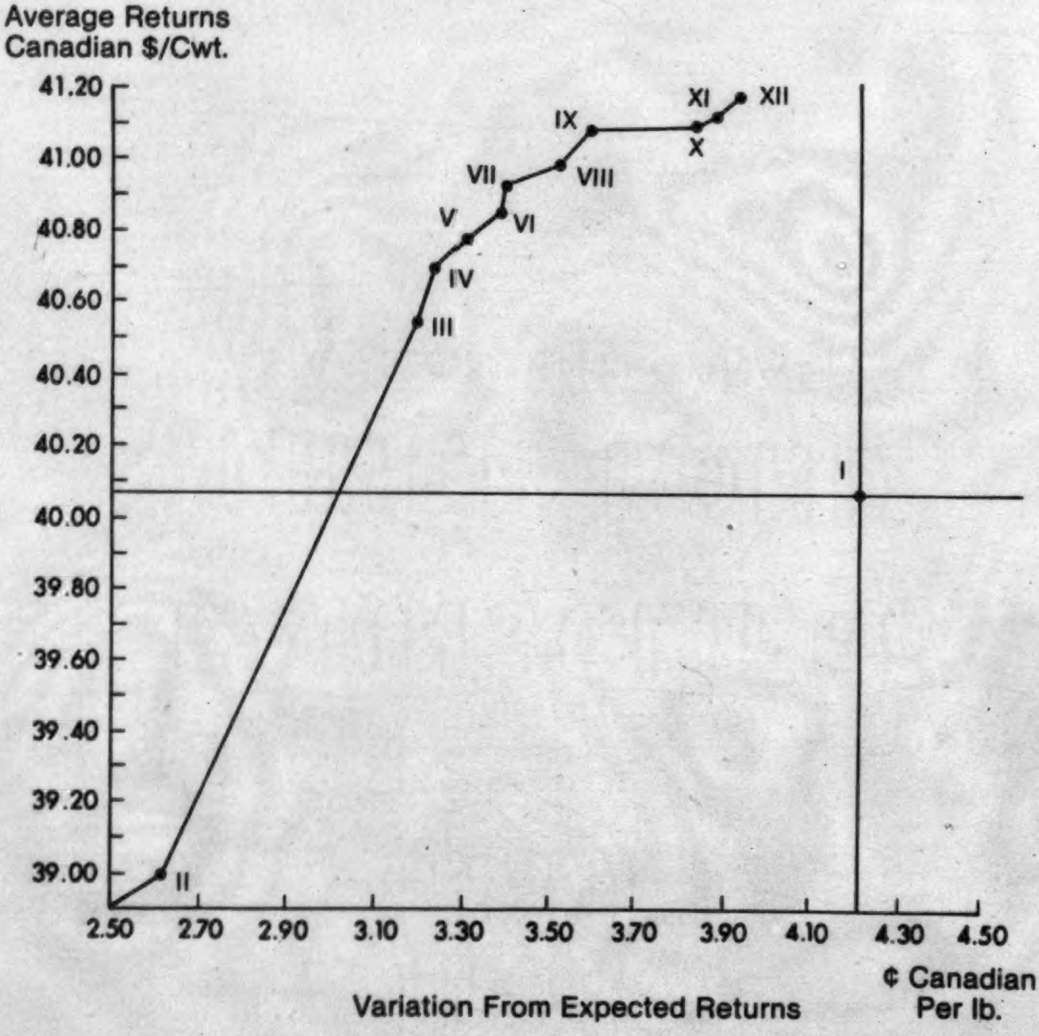
Strategy I - Unhedged: No hedging was used. The cattle were sold on the cash market. This strategy served as a benchmark to evaluate remaining strategies.

---

[22] McCoy, J.H., and Price, R.V. Cattle Hedging Strategies, Manhattan, Kansas: Kansas Agricultural Experimental Station, Kansas State University, August 1975.

Figure 3-2

Average Returns and Price Variation of
Twelve Selective Hedging Strategies -
Study by Martin, Groenewegen and Meilke



Source : Martin, L., Groenewegen, J. and Meilke, K. Commodity Futures Markets Hedging Opportunities for Ontario Pork Producers, School of Agric. Econ. and Extension Education, University of Guelph, Jan. 1976, p. 26.

Strategy II - Routine Hedge: Lots of cattle were hedged on a regular basis during the study.

Strategy III - Hedge when futures price-basis greater than or equal to the break even price: This strategy involved the adjustment of the futures price by the basis. A hedge was used only in the event that the adjusted futures price was greater than, or equal to, the required price to break even.

Strategy IV - Hedge when futures price-basis greater than or equal to the current cash price. This strategy involved the adjustment of the futures price by the location basis. A hedge was used only when the resulting price was greater than or equal to the current cash price.

Strategy V - Hedge when futures price-basis greater than or equal to break even price and greater than or equal to current cash price. This strategy is a combination of strategies III and IV.

Strategy VI - Hedge only those lots which are sold during the months of September, October, November, or December. This strategy consists of the routine hedging of those lots which were to be sold in the above months under the assumption that cattle prices are at a seasonal low during those months.

Strategy VII - Contract the sale of the cattle at a cash price equal to the current cash price. This strategy is designed to presell the cattle at existing prices.

The results of this study, which are given in Table 3-1, would indicate that Strategies II (routine hedging) and VII (contracting the sale) produced results which substantially reduced the variance of the average profit per head, while, at the same time, substantially reducing the average profit per head. Strategy V produced the highest

TABLE 3-1

Average Profits, Per Head, From 7 Alternative Cattle Hedging and Contracting Programs, May, 1965 - Dec., 1974 - Study by McCoy and Price

ALTERNATIVE		1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	AVERAGE 10 Yr PROFITS	VARIANCE	LOTS HEDGED
		dollars												
I.	Unhedged	36.30	13.68	2.97	18.67	26.77	-1.46	21.52	29.85	8.55	-53.11	9.55	1079.737	0
II.	Routine Hedge	15.51	16.12	14.01	6.23	2.23	-6.98	-7.36	-1.54	-29.06	-2.67	0.18***	417.243***	505
III.	Futures ≥ Breakeven	19.05	17.22	14.01	16.71	18.98	-5.32	21.45	27.28	2.05	-11.31	11.81	980.095	218
IV.	Futures ≥ Cash	29.89	23.48	14.01	19.36	26.10	-6.23	10.48	29.85	-10.89	-0.23	13.08*	732.439***	204
V.	Futures ≥ Break-even & ≤ Cash	29.89	23.33	14.01	19.36	26.10	-4.76	21.32	29.85	2.05	-12.28	14.43**	1060-335	145
VI.	Seasonal Hedged	31.65	17.22	6.66	14.39	28.29	0.96	10.61	24.24	20.80	-44.48	10.38	907.302**	174
VII.	Contract	19.69	17.43	-1.33	13.72	21.42	-0.97	2.06	21.43	-29.98	-34.38	2.41***	199.556***	0

*** Indicates that difference as compared to unhedged value is statistically significant at the one percent level.

** Indicates that difference as compared to unhedged value is statistically significant at the five percent level.

* Indicates that difference as compared to unhedged value is statistically significant at the ten percent level.

SOURCE: McCoy, J., Price, R. Cattle Hedging Strategies, (Manhattan, Kansas: 1975, Kansas Agricultural Experiment Station, Kansas State University), p. 4.

average profit per head, but only slightly reduced the variance of the profits during the period. Strategies III and VI resulted in only a slight increase in the average profit per head, while producing a slight decrease in the variance of the profit per head. Strategy IV would appear to have produced the best results of all of the strategies. This conclusion, however, would be subject to the hedger's tradeoff between a reduction in rich and higher profits. Regardless of this qualification this study does show that strategies III, IV, V and VI were superior to strategy I.

The results of these two studies were confirmed in similar studies by Wood,[22] Heifner, [23] and Schaefer.[24] A study by Keyon and Shapiro,[25] however, produced results that were somewhat different. This study examined the ability of the futures market to forecase profit margins in the Broiler Industry. An estimated profit margin, based upon the current futures prices and the current cash price for inputs was established. The actual profit margin was obtained by using current cash prices for the inputs and the cash market price at the end of the eight week feeding period. The results indicated that the estimated profit margin was inversely related to actual profit margins six to eight months prior to actual marketings. Thus, the results of this study were the opposite of what was expected.

---

[23] Wood, J.E., "Analysis of Potential Hedging Criteria for Live Hogs Using Seasonal Indices," American Journal of Agricultural Economics, Vol. 54, No. 5, (Dec., 1979), p. 972-975.

[24] Heifner, R.G., "Optimal Hedging Levels and Hedging Effectiveness in Cattle Feeding," Agricultural Economics Research, Vol. 24, No. 2, (April, 1972), p. 25-36.

[25] Schaefer, H.H., "The Determination of Basis Patterns and the Results of Various Hedging Strategies for Live Cattle and Live Hogs." Master of Science Thesis, Dept. of Economics, Iowa State University, Ames, Iowa, 1974.

[26] Kenyon, D.E., and Shapiro, N.P. The Ability of the Futures Market to Forecast Profit Margin in the Broiler Industry. Blacksburg, Virginia: Dept. of Agric. Econ., Virginia Polytechnic Institute and State University, August 1976.

These studies were all based upon the producers expected returns and/or profit margins. In this study, the expected income to the unhedged producer is simply the expected cash price tiems the expected quantity of finished beef produced, minus the expected cost of production, minus the current cost of the feeder steers as indicated in equation 3.1.

Equation 3.1: $ER_U = P_C Q_B - C_P - P_F Q_F$

ER_U = expected income unhedged.

P_C = expected cash market price for Calgary A1, A2 steers.

Q_B = the expected quantity of finished steers.

C_P = the expected cost of production

P_F = the current cash market price of feeder steers.

Q_F = the quantity of feeder steers placed on feed.

In the case of a hedger, the expected income is simply the expected profit from all hedges, times the expected exchange rate, minus the expected cost of the hedge, plus the expected return for the unhedged position, as indicated in equation 3.1.

Other Studies

One last study requires examinations before concluding this chapter. A thesis by L. Quantz at the University of Alberta in 1973 examined the "characteristics of the Winnipeg beef futures contract" which inhibited its growth in Canada.[27] The study attempted to evaluate the performance of the Winnipeg beef futures market by testing four hypothesis which would have indicated the existence of the necessary conditions for the success of the market. The four hypothesis which were tested are as follows:

(1) A reduction in risk results from the hedging operation in the futures market.[28]

(2) The cost of holding either a long or short futures position is equal to zero.[29]

(3) The level and seasonal pattern of the basis of the time of the sale differs throughout the year.[30]

(4) Pricing activity is continuous.[31]

The results of this study indicated that the beef future contract did provide a risk reducing mechanism. The most important observation of this study, however, was that the deficient volume of participation by hedgers in the Winnipeg beef futures market may be due in part to an upward bias in futures price.[32]

This lack of volume has not been a problem in the Chicago cattle futures market. For example, Quantz states that the Chicago live cattle contract has over 5,500 participants who hold contracts representing over 1,000,000 head of steers.[33]

---

[27] Quantz, L.E., "An Evaluation of Futures Trading on the Winnipeg Live Finished Beef Contract." Unpublished Master of Science Thesis, Department of Agricultural Economics and Rural Sociology, University of Alberta, Spring, 1973,

[28] Ibid., p.4

[29] Ibid., p.5

[30] Ibid., p.5

[31] Ibid., p.5

[32] Ibid., p.105

---

[33] Ibid., p.1

CHAPTER IV

THE CONCEPT OF BASIS

The importance of the basis and the role which it plays in determining the net effect of a hedge cannot be stressed too strongly. The basis is a fundamental concept of hedging which must be fully comprehended and, thus, is discussed at some length in this chapter.

The subject of basis has recieved much attention in the literature on futures trading. There still appears to be some ambiguity, however, over the precise meaning of this concept. In elementary terms, "the basis" or "the cash basis", is the difference between the futures contract price for the nearest delivery month and the cash price for a particular commodity at a par delivery point. In this particular study, the basis is calculated by subtracting the cash price from the appropriate futures price.

The term may also be used by designating a contract for a particular month (the July basis). This denotes the difference between the futures price for a July contract and the cash price for a particular commodity at a par delivery point.

The basis may also be designated by locality or geographical location. Thus, the term "the Denver basis", or "the July Denver basis", is the difference between the appropriate futures price and the Denver cash price for that particular commodity.

The Basis for Storable Commodities

The importance and the role of the basis varies for a storable commodity, such as corn, and a non-storable commodity, such as cattle. In either case, the meaning is the same; the factors, however, which determine the basis may vary.

In the case of a storable commodity such as corn, production occurs once a year and the supply is known until a new crop is harvested. Thus, the commodity is normally stored in the fall and is sold periodically on the market during the balance of the year. The cost of this storage is incorporated in the futures price and is reflected in the price difference between various contracts. A contract which calls for delivery in May, as opposed to one which calls for delivery in December will warrant a premium in its price. This premium is equal to the difference in the cost of the storage from December to May. Thus the May contract in corn will always be priced higher than the December contract by the amount of storage. In the same manner, the price for a particular contract will differ from the current cash price at a par delivery point by the cost of the storage. Hence the basis for a storable commodity is equal to the cost of storage. This, in turn, implies that the futures price in any given delivery month should equal the cash price, since the cost of storage is zero. The reason why, in fact, it may not, is discussed later in this chapter.

In order for a seller to make delivery on a contract, he must deliver the commodity to the delivery point specified in the contract (par delivery point). Hence, the cost of transporting the commodity to a par delivery point is reflected in the local cash price. Thus, at any given time, the local basis will be equal to the cost of storage and the cost of transportation to a par delivery point. The reason is simple. If the basis exceeds that amount then an individual could buy the particular commodity involved, store it and make delivery on the contract. The basis would pay for his transportation and storage cost, leaving an excess for a profit. On the other hand if the basis is less than the cost of storage and transportation, then every purchaser of a commodity would prefer to hold a futures contract in order to save the extra cost of storage and transportation.

This concept of basis applies only to those delivery months within the same crop year. That is to say, the price differential between a contract which calls for delivery this spring, as opposed to one which calls for delivery next fall, will not be equal to the cost of storage, since a new crop will be available to make delivery on the fall contract. In reality, the difference between delivery months does not simply vary by the cost of storage and transportation. There are several reasons for this, all of which are due to the uncertainty of holding a futures contract as opposed to the actual commodity. For example, the contract may specify a certain grade; it does allow, however, for delivery of inferior grades at an appropriate discount. That may not be satisfactory for a buyer of a contract, especially if he has committed himself to deliver a certain grade without substitution. Another factor is that the precise time of delivery is not known. The contract specification for grain allows for delivery anytime during a period of seven business days. In addition, an "act of God" may delay the delivery even further. Thus, although the buyer of a futures contract is reasonably assured of delivery during a specified period of time, there is still an element of uncertainty which is reflected in the price.

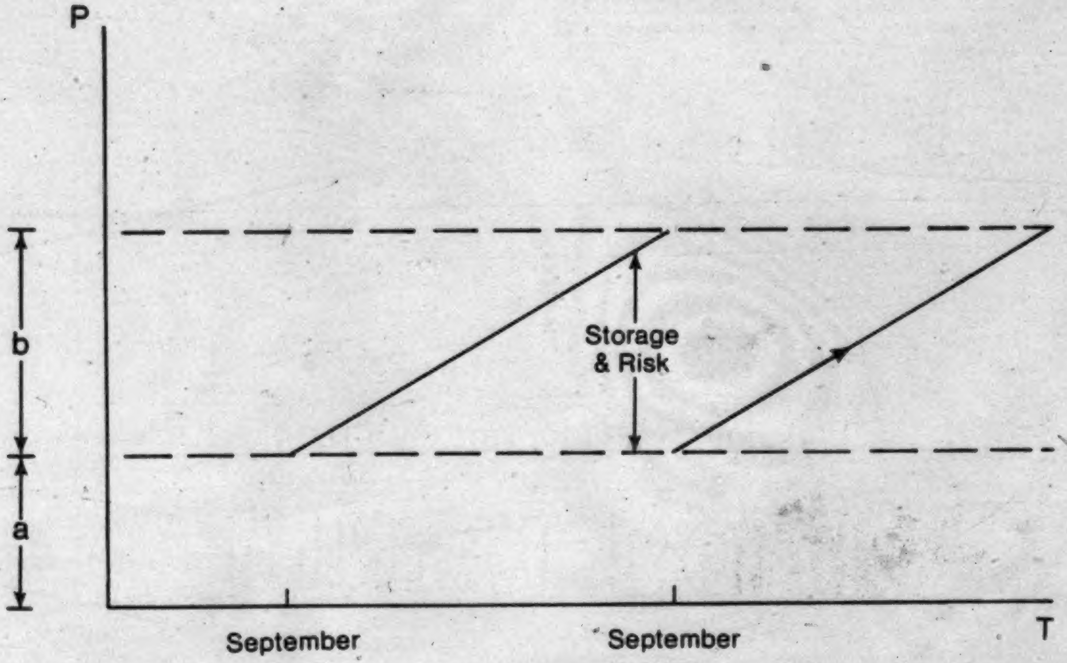
From the foregoing discussion, two key points arise: first, the basis at a par delivery point is approximately equal to the cost of storage plus a cost associated with the risk of uncertainty. Second, supply is known within a given crop year.

In the simplest case, if supply and demand were constant from year to year, then figure 4.1 would be indicative of the price of a futures contract.

In figure 4.1, September is the month in which the new crop is harvested. Since supply and demand are constant and known to them (a) is the price paid at the start of the crop year. Any price over and above that is due to the cost of storage and the element of uncertainty inherent in holding a futures contract as opposed to the actual commodity. Thus (a) and (b) increases each month until it reaches a maximum. With the availability of the new crop, (b) now equals zero and the price next September is equal to (a). In fact, supply and demand may change between crop years, and expectation of these changes tend to affect prices in the latter part of the crop year on the assumption that the purchase, or sale, of a commodity could be temporarily postponed to take advantage of any price change which may occur with the advent of a new crop.

The Basis for a Nonstorable Commodity

In the case of a nonstorable commodity, such as finished cattle, the commodity is continuously being produced; thus, there are no costs associated with storage. In addition, since the commodity is


P
b
a
Storage
& Risk
September
September
T

a = Cash Price in September
b = Cost of Storage and the Cost of Risk
T = Time Element in Months
P = Future Price of the Commodity at Time T

Figure 4.1: Relationship between Futures and Cash Price at a Par Delivery Point for a Storable Commodity.

continually being produced, supply is subject to variation.[1]

Since there is no cost of storage associated with the commodity, the futures price in the delivery month equals the current cash price. For those markets which are not par delivery points, say Denver, the Denver basis in the delivery month is equal to the cost of transportation.

For those contracts which are not for the current delivery month, there is a certain degree of uncertainty concerning the supply and demand. Thus, the further forward a contract is, the greater the degree of uncertainty.

A study by R. Leuthold[2] indicates that there is a close relationship between the cash price and the futures price which is approximately equal to the required feeding period to fatten an animal for market. This would support the theory that once animals are placed on feed, that supply is known and not subject to a sizeable change.

A second component of the basis for a nonstorable commodity is the inherent risk of holding a futures contract as opposed to the actual commodity. These risks are again associated with the uncertainty of time and quality, discussed previously in relation to storable commodities.

---

[1] Although it takes approximately three years from the time a cow is bred until its offspring is marketed, supply is variable in a number of ways: for example, the sale of breeding stock, or the feeding of cattle for a longer period.

[2] Leuthold, R.M., "The Price Performance on the Futures Market of a Nonstorable Commodity: Live Beef Cattle", Selected Writings on Futures Markets. (Chicago Board of Trade, 1977, Vol. 2, p.375-395

In the case of a nonstorable commodity, if supply and demand were constant and known, then the basis at a par delivery point would be equal to the compensation for the risk of holding a futures contract. In fact, supply and demand are not known; thus, the basis reflects a degree of uncertainty plus compensation for the risk of holding a future contract. In the event that the expected price due to supply and demand is greater than the current price, then the basis for future delivery months will be greater than zero. On the other hand, if the expected price due to supply and demand is less than the current price, the basis will be less than zero.

From the foregoing discussion a number of key points arise concerning the basis:

(1) In the case of a nonstorable commodity there are no storage costs: thus, for a contract in the current delivery month at a par delivery point, the basis is equal to a cost associated with the risk of uncertainty and the risk of holding a futures contract.

(2) The expected price is subject to variation due to changes in supply and demand. Thus, this uncertainty is reflected in futures prices by changes in the basis from one contract to the next.

(3) Previous studies suggest that uncertainty increases over time; thus, the basis is subject to greater change the further forward the contract is.

A Declining Basis

We have discussed the concept of basis and the factors which determine it. We will now discuss the effect that a change in the basis will have on a hedge.

Such a change would occur, for example, in the case where the cash price was intially 2¢ under the futures price and it changed so that the cash price was 2¢ over the futures price, it can be said that the basis decreased from +2¢ to -2¢. This can happen in three ways:

(1) the cash price can increase by 4¢ while the futures price remains constant;

(2) the futures price can decrease by 4¢ while the cash price remains constant;

(3) the futures price and the cash price change in such a manner so that the cash price exceeds the future price by 2¢.

The effect of such a change on a hedge varies depending on the type of hedge involved.

In the case of a sell hedge the hedger has sold a contract. Since there is no change in the futures price, he would show zero profit from his futures transactions. Since the cash price has increased 4¢, however, the hedger would recieve an anticipated 4¢ extra profit on his cash transaction. If the futures price should decrease, and the cash transaction remains unchanged, then he would make an unanticipated extra 4¢ profit on the futures transaction. The third possibility is a combination of the two. Regardless of which possibility developes, the net effect is that a declining basis on a sell hedge results in a windfall profit.

In the case of a buy hedge the opposite effect occurs. The hedger buys one contract; hence, a 4¢ rise in the cash price, or a 4¢ decrease in the futures price, would result in an unanticipated loss of 4¢. Thus, the net effect is that a declining basis with a buy hedge results in an unanticipated decrease in the profit of the hedge.

An Increasing Basis

An example of an increasing basis is the case in which the cash price was 2¢ over the futures price, but it changed so that the cash price was 2¢ under the futures price. Thus, it can be said that the basis increased from -2¢ to +2¢. This can happen in three ways:

(1) the cash price can decrease by 4¢ while the futures price remains constant;
(2) the future price can increase by 4¢ while the cash price remains constant;
(3) the futures price and the cash price change in such a manner that the futures price exceeds the cash price by 2¢.

The effect of such a change again varies depending on the type of hedge involved.

In the case of a sell hedge, the hedger has sold a contract; thus, the hedger's profit on the cash transaction decreases by 4¢, whereas he shows a zero profit on the futures contract. If, as in the second possibility, the futures price should increase 4¢, then the hedger would incur an unanticipated loss of 4¢ on the futures contract while his profit on his cash transaction remains unchanged. The third possibility is a combination of the two. Regardless of which possibility develops, the net effect is that an increasing basis on a sell hedge results in an unanticipated loss on the hedge.

In the case of a buy hedge, the opposite effect is the case. The hedger buys one contract; hence, a 4¢ decrease in the cash price, or a 4¢ increase in the futures price, results in an unanticipated profit. Thus, an increasing basis on a buy hedge results in an unanticipated profit from the hedge.

Termination of a Contract

A fundamental concept of hedging is that the hedger can terminate his contract in one of two ways:

(1) by making or accepting delivery on the contract
(2) by buying or selling a contract to offset his existing contract.

In the case of a Canadian producer the first alternative is not usually feasible because of the difference in grading standards, government regulations (eg. wheat), or the difficulties associated with transporting the product. Thus, a Canadian producer has only the option of offsetting his existing contracts. That may or may not become a factor depending on whether or not there is a change in the basis during the period of the hedge. For example, in the case of a sell hedge, and where there has been an increase in the basis, it may become more profitable for the producer to make actual delivery on the futures contract, as opposed to closing out his position by buying a contract to offset his previous sale. This alternative is not readily available to a Canadian producer as it is for a United States producer.

The Calgary Basis for Cattle

The previous discussion has been primarily concerned with the concept basis. It has assumed that the futures market and the cash market both exist within the boundaries of the same country. In this particular study, an attempt is being made to study the effects of hedging a Canadian product on a United States futures market. Thus, the concept of basis from the view point of this study becomes somewhat more complicated.

Before any discussion of the basis for cattle can be undertaken, the factors which affect Canadian cattle prices and their relationship to their U.S. counterpart must be understood.

For the most part, the price of Canadian beef is determined by the United States price because of the dominant role it plays over the Canadian market.[3] This fact would imply, therefore, that Canadian Cattle prices are basically a function of U.S. prices. In the absence of transfer costs and tariffs, the Canadian price should equal the United States price expressed in Canadian dollars.[4]

Because transfer costs and tariffs, have been introduced, this direct relationship no longer holds true. Since the U.S. price, tariffs and transfer costs are exogenous variables, and thus should be taken as given, the Canadian market system will adjust prices to reflect changes in these variables. The market system, however, will not directly reflect changes in these prices because no direct functional relationship exists between them. That is to say, the Canadian price is not simply a function of the U.S. price, tariffs, transfer costs (although there is probably a direct functional relationship between Canadian price and exchange rate), but rather, the Canadian price is constrained by the U.S. price. The upper constraint will be U.S. price[5] + Canadian tariff + transfer costs; whereas the lower constraint will be the U.S. price[5] - U.S. tariff - transfer costs. At any Canadian price within those constraints there is no incentive to trade. Should the Canadian price drop below this lower constraint, then cattle will be shipped to the U.S., causing the Canadian price to increase to such a level that there will be no further incentive to export cattle. On the other hand, should the Canadian price rise above the upper constraint, then cattle would be imported from the U.S., causing a drop in the Canadian price which would eliminate the incentive to import cattle. At any price within these constraints, the Canadian price is free to fluctuate according to factors, such as the supply and demand, within the Canadian economy.

---

[3] P. Tryfos, "The Determinants of Prices and Employment in the Canadian Meat Industry":, Canadian Journal Agricultural Economics, July 1973 p. 26.

[4] This implies that the marketing system will automatically adjust Canadian prices to reflect any change in the exchange rate, and that trade can take place.

The basis was previously defined as the futures price in Canadian dollars, minus the Calgary cash price. The foregoing discussion would therefore, suggest that the Calgary basis is subject to variation. In fact, since the Canadian price is free to move between these two boundaries without regard to movements in the U.S. cash price, this would also imply, that the basis will do likewise. Thus, the Calgary basis is free to fluctuate between these two limits by the amount of the U.S. price[5] + Canadian tariff + transfer costs to Canada (the upper limit) MINUS the U.S. price[5] - U.S. tariff - transfer costs to the U.S. (the lower limit), which EQUALS Canadian tariffs + transfer costs to Canada + U.S. tariffs + transfer costs to the U.S.

---

[5] In Canadian dollars.

It should be remembered that the foregoing situation may not always be the case. For example, should the Canadian price be equal to the upper limit of U.S. price in Canadian dollars + Canadian tariff + transfer costs to Canada, and should this upper limit move, it is entirely possible that the Canadian price would change accordingly. This, therefore, implies that at certain times it is possible that a direct functional relationship exists between the Canadian price, the U.S. price, and the exchange rate on certain occasions.

The Calgary Basis for Barley

In May, 1976, the Canadian Wheat Board announced a policy whereby Wheat Board sales of feed wheat, oats, and barley would be sold to the domestic market at a corn competitive price.[6] The formula for calculating these prices was announced on July 14 and implemented August 1, 1976. The formula is based upon the concept that "the long term" equilibrium "soymeal-corn price ration is 1.8 to 1; comparative values of wheat , oats and barley established for these levels then become the reference or "bench-mark" values. As this ratio increases, meaning that soymeal prices are rising faster than corn, the higher protein content of wheat, oats and barley becomes more valuable. Hence, their feeding value in relation to corn increases. The converse is true as the soymeal-corn price ratio falls below 1.8 to 1."[7] This formula is based on the landed cost of corn and soymeal at Montreal, which is calculated by taking the U.S. price plus transportation, handling, customs duty, and currency exchange rates into accoutn.[8] The formula values for wheat, oats, and barley in Montreal are backed off to Thunder Bay by transportation and handling charges to arrive at a Canadian Wheat Board price in store at that point.[9] Canadian Wheat Board selling prices for points west of Thunder Bay are determined by the Lakehead price, less the appropriate freight charges, less the appropriate freight charges based on the Crow's Nest Pass Rates.[10] Sales are arranged through elevator companies as canadian Wheat Board Agencies.[11]

---

[5] In Canadian dollars.

[6] H.G. Coffin, "The Case for Formula Pricing of Canada's Feed Grains", Canadian Journal Agricultural Economics: CAES Workshop Proceedings, March, 1971, p.47-65.

The basic transportation, handling, and tariff components which are used to adjust the U.S. price of corn anre relatively stable at 33 to 35 cents per bushel for corn on a year round basis. During the navigation season, this factor is applied to U.S. cash corn aboard vessel at Chicago or Toledo, whereas during the closed navigation season, it is applied to the U.S. March futures price for corn.[12]

---

[7] Ibid., p.64.

[8] Ibid., p.65.

[9] Ibid., p.65.

[10] Ibid., p.65.

[11] Ibid., p.65.

This formula pricing should establish a relationship between the Calgary price for barley, U.S. corn futures price, and the exchange rate. Thus, the Calgary basis for barley should be a function of U.S. corn prices and the exchange rate.

The Effect of the Exchange Rate

Our previous discussions have indicated that the Canadian basis is comprised of expected price in the U.S., transportation costs, tariffs, the exchange rate, and, in the case of barley, storage costs. Of these factors, transportation costs and tariffs are relatively constant, at least in the short run. The expected price in the U.S. and the cost of storage are factors which are common to both the U.S. and Canada. The exchange rate, however, and its effect on the basis, is unique to a Canadian hedger, and thus, warrants special discussion.

The exchange rate affects the hedger in two ways:

(1) it affects the Canadian price for the commodity as was previously discussed, and

(2) any profit or loss on the futures transaction is in U.S. dollars, and thus the net profit or loss to a Canadian dollar will be determined by the current exchange rate.

The effect in the latter case is fairly obvious. Let us assume the Canadian dollar was at par at the time the hedge was placed, and that at the time that the hedge was lifted, the Canadian dollar was worth $0.85 U.S. This change in the exchange would directly affect the

---

[12] Ibid., p.65.

Canadian hedger by increasing any profit or loss from the futures contract. If on the other hand, the Canadian dollar was worth $1.10 U.S. at the time the hedge was lifted, the result would be that any profit or loss would decrease because of the change in the exchange rate. The key point is that this change in the profit or loss from the futures contract is unanticipated, and is due solely to the exchange rate. This change will not be directly offset by an equal change in the profit or loss from the cash transaction; thus, the result of the hedge is affected by any abrupt change in the exchange rate.

In addition, a change in the exchange rate will also have an effect on the cash prive received for the finished cattle and on the costs of the major inputs, feeder cattle and barley. W.E. Kost in his paper "Effects of an Exchange Rate on Agricultural Trade" summarizes the effects as follows: A devaluation in the exporting country's currency will result in an increase in demand for any particular commodity by the importing country. Such an increase will cause an expansion in the quality exported as well as a rise in the price (expressed in the exporter's currency units.)[13] A devaluation of its currency by the importing country will result in a decrease in imports, thus producing a drop in the price of the good in the exporting country.[14] Thus, in the case of Canadian cattle, prices will rise and fall depending on the Canadian/U.S. exchange rate, and whether or not Canada is on an import basis or an export basis for cattle. This, rise or fall, of course, will be reflected in the price which the producer receives for finished cattle, or the price paid for feeder cattle.

---

[13] W.E. Kost, "Effects of an Exchange Rate Change on Agricultural Trade," Agricultural Economics Research. Vol. 28, No. 3, (JuTy, 1976), p. 103.

[14] Ibid., p.103.

In this chapter, the concept of the basis and the factors which affect the Calgary basis for cattle and for barley have been discussed. In Chapter VI the results of the study of the Calgary basis will be discussed.

CHAPTER V

COST OF PRODUCTION MODEL

A computer simulation model was used to generate estimates of producers income for the period under study. A flow chart of this model is given in Figure 5-1. The following text is a more detailed explanation of this model.

The period December 29, 1975,[1] to June 9, 1978, is used for the purpose of simulating a Calgary feedlot. The daily Calgary cash price for feed barley was obtained from United Grain Growers Limited, Calgary. These daily prices were converted to weekly prices using a simple average.

In the case of feeder cattle and finished steers, weekly average cash prices were obtained from the Agricultural Canada Livestock meat trade report for Edmonton good feeder steers 600-700 lbs. and Calgary A1, A2 steers over 1,000 lbs.

Recent feed trials at the Agriculture Canada Research Station, Lethbridge, Alberta, have indicated that, on average, a 700 lbs. feeder steer which is fed a diet of 90 percent barley and 10 percent hay for a period of 17 weeks (119 days), will gain weight at an average rate of 218 lbs. per day, yielding a final market weight of 1,033 lbs. During this time, the animal will consume an average of 17.7 lbs. of barley per day. A feedlot size of 900 head has been chosen as being represen-

---

[1] An explanation of the choice of this date is given later in this chapter.

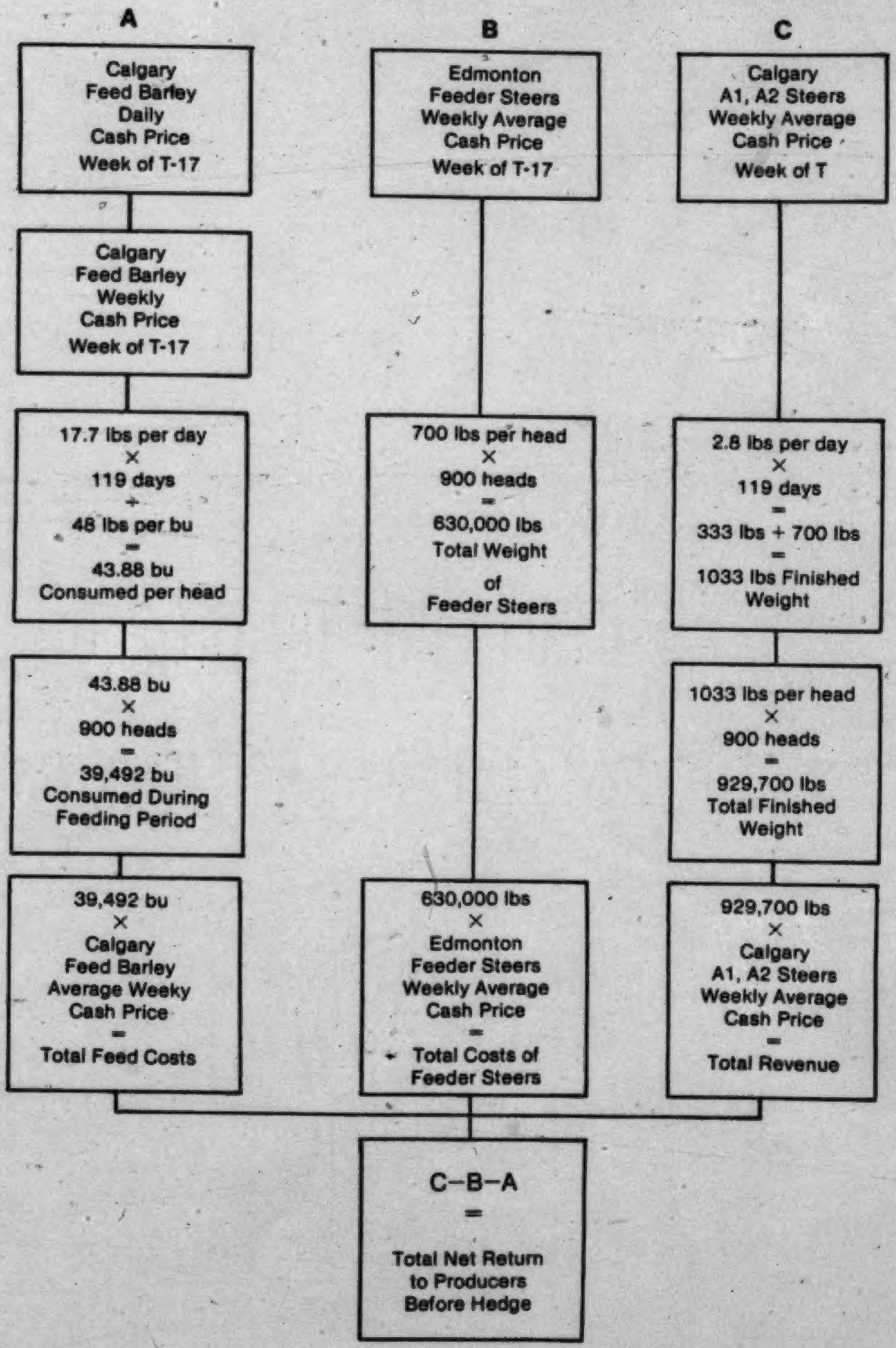

A
Calgary Feed Barley Daily Cash Price Week of T-17
Calgary Feed Barley Weekly Cash Price Week of T-17
17.7 lbs per day × 119 days ÷ 48 lbs per bu = 43.88 bu Consumed per head
43.88 bu × 900 heads = 39,492 bu Consumed During Feeding Period
39,492 bu × Calgary Feed Barley Average Weeky Cash Price = Total Feed Costs
B
Edmonton Feeder Steers Weekly Average Cash Price Week of T-17
700 lbs per head × 900 heads = 630,000 lbs Total Weight of Feeder Steers
630,000 lbs × Edmonton Feeder Steers Weekly Average Cash Price = Total Costs of Feeder Steers
C
Calgary A1, A2 Steers Weekly Average Cash Price Week of T
2.8 lbs per day × 119 days = 333 lbs + 700 lbs = 1033 lbs Finished Weight
1033 lbs per head × 900 heads = 929,700 lbs Total Finished Weight
929,700 lbs × Calgary A1, A2 Steers Weekly Average Cash Price = Total Revenue
C−B−A = Total Net Return to Producers Before Hedge

Figure 5.1

Feedlot Simulation Model Flowchart

tative of an average Calgary feedlot. Feeding periods are initiated each week for a period of 17 weeks; thus, there will be 138 feeding periods during the time period under consideration.

To simplify this model, the following assumptions have been made:

(1) The feeder steers are all purchased in the same week. Purchases are spread evenly over the number of business days in the week; hence, the use of an average weekly price.

(2) The total feed barley requirements for the entire feeding period are purchased during the first week of the feeding period. Purchases are spread evenly over all the business days in the week; hence, the use of an average weekly price.

(3) The steers are fed for exactly 119 days. Hence, those cattle which were purchased as feeders on Monday are sold on Monday of the 17th week, exactly 119 days later.

(4) The fatten steers are sold evenly over all of the business days of the 119 week; hence, the use of an average weekly price.

(5) All of the finished steers graded either A1 or A2.

(6) No allowance for death losses was made. An allowance for death losses would have involved a constant for all periods and, thus, have little real effect on the different hedging strategies.

(7) The feedlot is an ongoing concern.

The income to the producers is measured simply as a profit or loss for the feeding period. This income is calculated by taking the total revenue from the sale of the steers and subtracting the total cost of the feeder steers and the feed costs.

Placement and Lifting of Hedges

In placing any hedge the primary consideration is the choice of the specific contract month for any given commodity. The first requirement in choosing a praticular contract is that the contract must be traded during the entire period of the hedge. If a contract is not traded during the entire period of the hedge, the producer would be forced to lift his hedge prior to the termination of trading, and replace his hedge with a different contract. This would not only incur additional cost, it would also place the producer in jeopardy if there should be a difference in basis between the two contracts. The second requirement in choosing a contract is that there must be sufficient volume traded to allow the hedger to place and lift his hedge without incurring any danger of a temporary price distortion.

Raymond Leuthold in a study conducted on the live cattle contract, found that "for distant futures, the cash price is a more accurate indicator of future price conditions than is the futures price."[2] This would suggest that the best contract for the purpose of hedging is that contract which matures in the closest month following the date on which the hedge is lifted. It should be remembered, however, that as the last trading day for a contract approaches, the volume traded decreases until it reaches the point that only those buyers and sellers who wish to accept or make delivery of the actual commodity, are left with outstanding contracts. In view of the fact that a Canadian producer would not normally wish to make delivery on a contract, this study uses the contract whose last trading day falls in the nearest month following the month in which the hedge is lifted.

---

[2] R. Leuthold, "The Price Performance of the Futures Market of a Non-Storable Commodity: Live Beef Cattle," American Journal of Agricultural Economics, May 1974, p.276.

As outlined in Chapter 11, there are two types of hedges; a sell hedge and a buy hedge. The method whereby a hedge is initiated varies, depending on the type of hedge involved.

In this study two buy hedges (corn, feeder cattle) and one sell hedge (live cattle) have been employed. The placing and lifting of the two buy hedges is similar; thus, we will only discuss the corn hedge in detail. In those cases where the hedge for feeder cattle may differ, we will explain the feeder cattle hedge as well. An implicit assumption involved in the placement of the hedges is that the feedlot is an ongoing concern, and that this study examines the results for only a specific period of time. The purpose of the two buy hedges is that, since the feedlot is an ongoing concern, preparation is made for the following feeding period at the start of the current feeding period. Thus, the buy hedges are assumed to lock in input costs for the following feeding period. The net results for all of the hedges are examined, however, at the end of each of the specific feeding periods. A flow chart showing how the placement and lifting of hedges are enacted is given in Figure 5-2.

The closing prices for each of the three commodities contracts were obtained from the Wall Street Journal, the Toronto Globe and Mail, The Chicago Board of Trade Yearbook, and the Chicago Mercantile Exchange

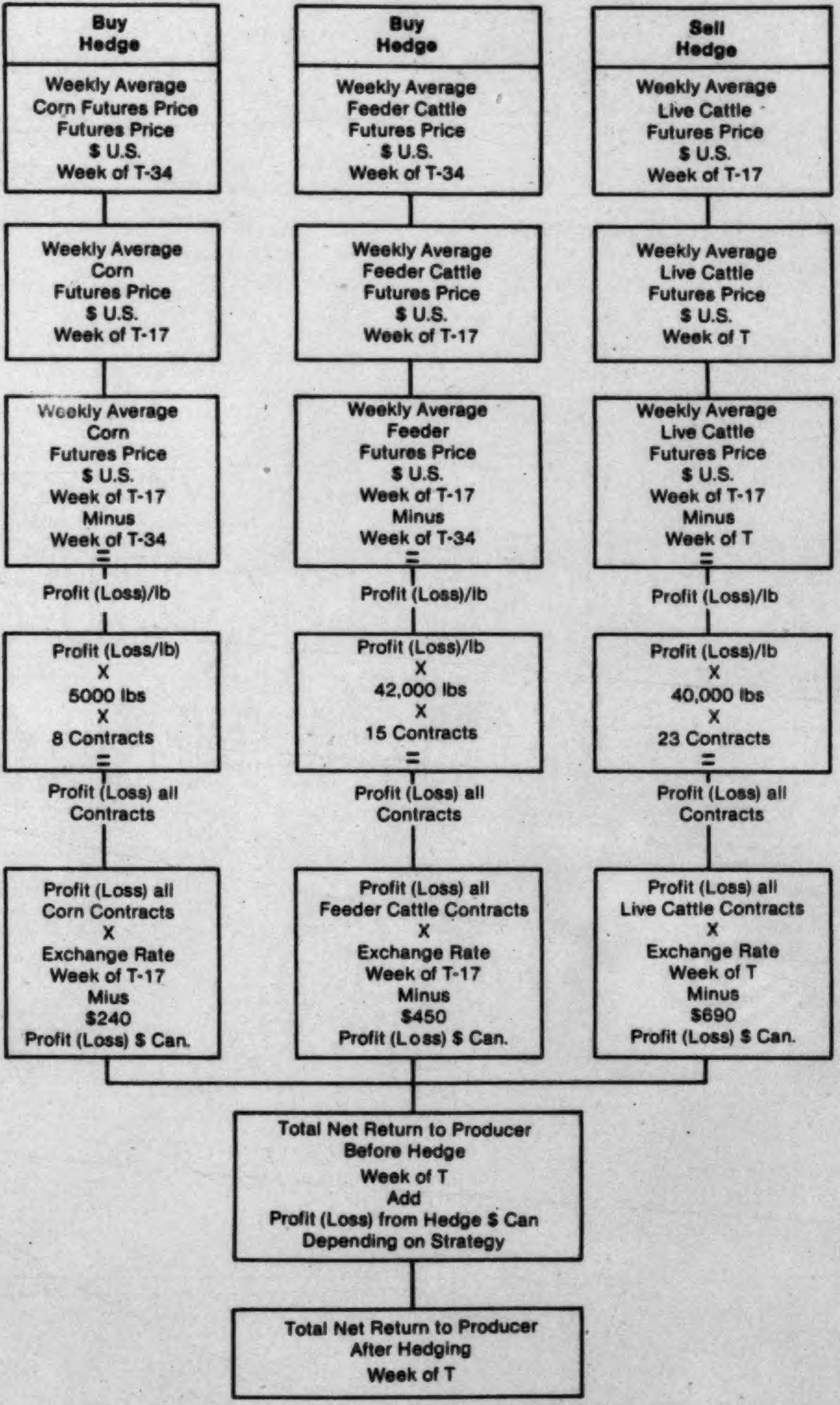

Buy Hedge
Weekly Average Corn Futures Price Futures Price $ U.S. Week of T-34
Weekly Average Corn Futures Price $ U.S. Week of T-17
Weekly Average Corn Futures Price $ U.S. Week of T-17 Minus Week of T-34 =
Profit (Loss)/lb
Profit (Loss/lb) X 5000 lbs X 8 Contracts =
Profit (Loss) all Contracts
Profit (Loss) all Corn Contracts X Exchange Rate Week of T-17 Mius $240 Profit (Loss) $ Can.
Buy Hedge
Weekly Average Feeder Cattle Futures Price $ U.S. Week of T-34
Weekly Average Feeder Cattle Futures Price $ U.S. Week of T-17
Weekly Average Feeder Futures Price $ U.S. Week of T-17 Minus Week of T-34 =
Profit (Loss)/lb
Profit (Loss)/lb X 42,000 lbs X 15 Contracts =
Profit (Loss) all Contracts
Profit (Loss) all Feeder Cattle Contracts X Exchange Rate Week of T-17 Minus $450 Profit (Loss) $ Can.
Sell Hedge
Weekly Average Live Cattle Futures Price $ U.S. Week of T-17
Weekly Average Live Cattle Futures Price $ U.S. Week of T
Weekly Average Live Cattle Futures Price $ U.S. Week of T-17 Minus Week of T =
Profit (Loss)/lb
Profit (Loss)/lb X 40,000 lbs X 23 Contracts =
Profit (Loss) all Contracts
Profit (Loss) all Live Cattle Contracts X Exchange Rate Week of T Minus $690 Profit (Loss) $ Can.
Total Net Return to Producer Before Hedge Week of T Add Profit (Loss) from Hedge $ Can Depending on Strategy
Total Net Return to Producer After Hedging Week of T

Figure 5.2

Placement of Hedges Flowchart

Yearbook, on a daily basis. The daily prices were converted to weekly average prices by taking a simple average.

In the case of the corn contract, the replacement cost of the feed barley which is to be used in the next feeding period (39,492 bu) is being hedged. Hence, eight Chicago corn contracts, which are equal to 40,000 bushels, were brought 34 weeks (T-34) prior to the end of the feeding period. For feeder cattle, 15 contracts are bought (630,000 lbs.) 34 weeks (T-34) prior to the end of the feeding period. In both of the foregoing cases, the average weekly price for that week is used to determine the purchase price of the contracts.

The hedge is lifted in the week in which the corn is actually purchased, or at the start of the feeding period. Hence, 8 Chicago corn contracts and 15 Chicago feeder contracts are sold at the average weekly price for that particular week (T-17).[3]

The profit or loss on the hedge is calculated by subtracting the price at which the contracts were purchased from the price at which they were sold. For the corn contract, the net profit or loss will be this difference times 5,000 bu, times 8 contracts. For the feeder cattle contract, the net profit or loss will be this difference times 42,000 lbs. times 15 contracts.

The purpose of a sell hedge is to lock in for the producer the price of a commodity which he is planning on selling at some point in the future. In this study, the producer is attempting to lock in at the start of the feeding period a price for 929,700 lbs. of finished beef. Hence, 23 live cattle contracts (920,000 lbs.) are sold at the start of the feeding period in order to place the hedge. The average weekly price for that particular week is used to determine the price at which the contracts are sold.

---

[3] It is assumed that a hedge is lifted the same day of the week as it was placed. Hence, a hedge will last for exactly 119 days.

The hedge is lifted at the end of the feeding period (T) by buying 23 live cattle contracts at the corresponding average weekly price. The profit or loss on the sell hedge is calculated by subtracting the price at which the contracts were sold. For the live cattle contract, the net profit or loss will be this difference times 40,000 lbs. times 23 contracts.

In all of the foregoing cases, the net profit or loss will be in United States dollars; hence, the profit or loss is converted to Canadian dollars. The net profit or loss in Canadian dollars (depending on the case), is added to or subtracted from the net return to the producer which was calculated previously. In addition, $30 per contract is allowed for brokerage fees. Thus $240, $450, and $690 is deducted from the net profit or loss in Canadian dollars for each of the barley hedge, feeder cattle hedge, and live cattle hedge respectively.

The results for the simulation of the feedlot and the hedges are given in Appendix B. Column 1 shows the net return to the producer before hedging; Column 2-4 shows the profit or loss on the hedges for corn, feeder cattle, and live cattle respectively.

Problems in the Data

The results of this study might have been improved had daily data been used. In the collection of daily data, however, it was quickly learned that a large number of observations for feeder cattle and for Calgary A1, A2 steers would have been missing. This was especially true for feeder cattle during the summer months. Thus, the use of daily data would have affected the continuity of the time period of the study.

It would also have improved this study had a larger time span been employed. Due to the fact, however, that import controls were in effect in Canada and the United States on live cattle until August 1975, we were unable to use a longer time period.

CHAPTER VI

METHODOLOGY AND RESULTS

Hedging Strategies

A number of studies were reviewed in chapter III. The methodology employed in each of those studies was to develop several alternative hedging strategies and then to evaluate their effectiveness as a hedging strategy. The same methodology is employed in this study.

Two types of strategies, "naive" and "selective", will be evaluated in this study. The naive strategy is one in which the producer constantly employs the same type of strategy, i.e., always hedge. The selective type of strategy is one in which a producer takes a different action (hedge, not hedge) depending on the current situation. An example would be to hedge finished cattle if the current futures price is greater than the current cash price, and not to hedge if the current futures price is less than, or equal to, the current cash price.

The next two sections describe the different strategies employed in this study. The following are a list of symbols which are used in describing the strategies:

F_p - current future price

C_p - current cash price

$\geq$ - greater than or equal to

$\leq$ - less than or equal to

B_c - current basis

$\overline{X}_B$ - mean of the basis

$<$ - less than

$>$ - greater than

$\overline{X}_B - O_B$ - the mean of the basis minus the standard deviation of the basis.

$\overline{X}_B + O_B$ - the mean of the basis plus the standard deviation of the basis.

Naive Strategies

1. No hedge. This strategy employs no hedging. Cash market prices are used for the feeder cattle, barley, and finished cattle.

II. Full hedge. This strategy routinely employs hedging for each feeding period. Finished cattle are hedged using the live cattle contract, feeder cattle are hedged using the feeder cattle contract, and barley is hedged using the Chicago corn contract.

III. Hedge feeder cattle only. This strategy routinely employs hedging of the feeder cattle only. Cash market prices are used for barley and the finished steers.

IV. Hedge for barley only. This strategy routinely employs hedging of the feed barley using the Chicago corn contract. Cash market prices are used for feeder cattle and for finished cattle.

V. Hedge finished cattle only. This strategy routinely employs hedging of the finished cattle in each feeding period. Cash market prices are used for feeder cattle and for barley.

Selective Strategies

VI. Hedge finished cattle if $F_p \geq C_p$. Hedge feeder cattle if $F_p \leq C_p$. Hedge barley if $F_p \leq C_p$. This strategy assumes that the current futures price is a better indicator then current cash price of future cash prices. Hence, finished cattle are hedged only if the current futures price (F_p) $\geq$ the current cash price; feeder cattle are hedged only if the current futures price (F_p) $\leq$ the current cash price. and barley is hedged only if the current futures price $\leq$ the current cash price.

VII. Hedge finished cattle if $B_c < \overline{X}_B$. Hedge feeder cattle if $B_c > \overline{X}_B$. Hedge barley if $B_c > \overline{X}_B$. This strategy employs a hedge depending on the basis. It assumes that the basis will not shift dramatically between the time the hedge is placed and the time it is lifted. Hence, finished cattle are hedged only if the current basis (B_c) is less than the mean of the basis ($\overline{X}_B$). In the case of feeder cattle and barley, a hedge is used only if the current basis (B_c) is greater than the mean of the basis ($\overline{X}_B$).

VIII. Hedge finished cattle if $B_c < \overline{X}_B - O_B$. Hedge feeder cattle if $B_c > \overline{X}_B + O_B$. Hedge barley if $B_c > \overline{X}_B + O_B$. This strategy is a refinement of strategy VII. In this strategy the mean is adjusted by the standard deviation to eliminate some hedges. Hence, finished cattle are hedged only if the current basis (B_c) is less than the mean minus the standard deviation ($\overline{X}_B - O_B$). In the case of feeder cattle and barley, a hedge is used only if the current basis B_c is greater than the mean plus the standard deviation ($\overline{X}_B + O_B$).

Method of Analysis

In order to satisfy the objectives of this study, the analysis of the results must focus on two questions: (1) how much variation occured in net returns over time? and (2) what was the average net return to the producer over time?

The answers to these two questions are illustrated by figure 6.1. Similar methods of analysis have been used in other studies.[1]

In figure 6.1 the means ($\overline{X}$) of the returns to the producer are plotted on the vertical axis and the standard deviations of the returns are plotted on the horizontal axis. The results of the hedged positions are compared to the results of the unhedged position (strategy 1). The results of the unhedged position are plotted on the graph to produce a quadrant effect as in figure 6.1. The results for each of the remaining strategies are then plotted on the graph in relation to the unhedged position.

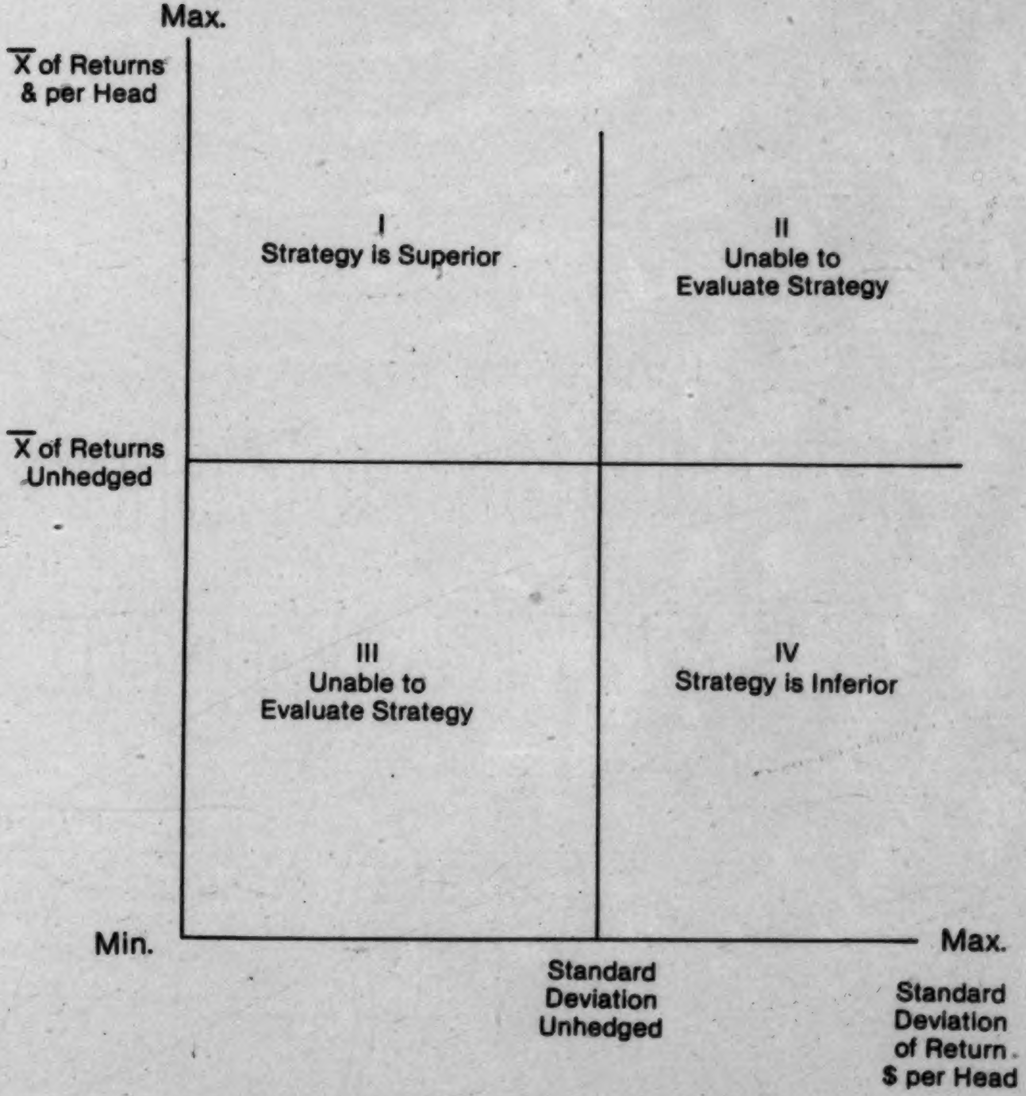
If a strategy produces results which have a higher mean return and a lower standard deviation than was the case for the unhedged position then the results would fall in quadrant 1. Thus, this strategy would be judged to be superior because of the decrease in the standard deviation of the returns and the higher mean level of the returns.

In the case of a strategy producing results which have a lower mean return and a higher standard deviation than was the case with the unhedged position, the results would fall in quadrant IV. Thus, this strategy would be considered to be inferior because of the increase in

---

[1] Martin L.: Groenewegen, J.: Meilke, K. Commodity Futures Markets, Hedging Opportunities for Ontario Pork Producers School of Agricultural Economics and Extension Education, University of Guelph, January, 1974.

Figure 6.1: Analysis of Returns


Max.
$\overline{X}$ of Returns & per Head
$\overline{X}$ of Returns Unhedged
Min.
I
Strategy is Superior
II
Unable to Evaluate Strategy
III
Unable to Evaluate Strategy
IV
Strategy is Inferior
Standard Deviation Unhedged
Max.
Standard Deviation of Return $ per Head

Evaluation of strategies which fall in quadrants II and III are determined by producer's reaction to risk.

the standard deviation of the returns and the lower mean return.

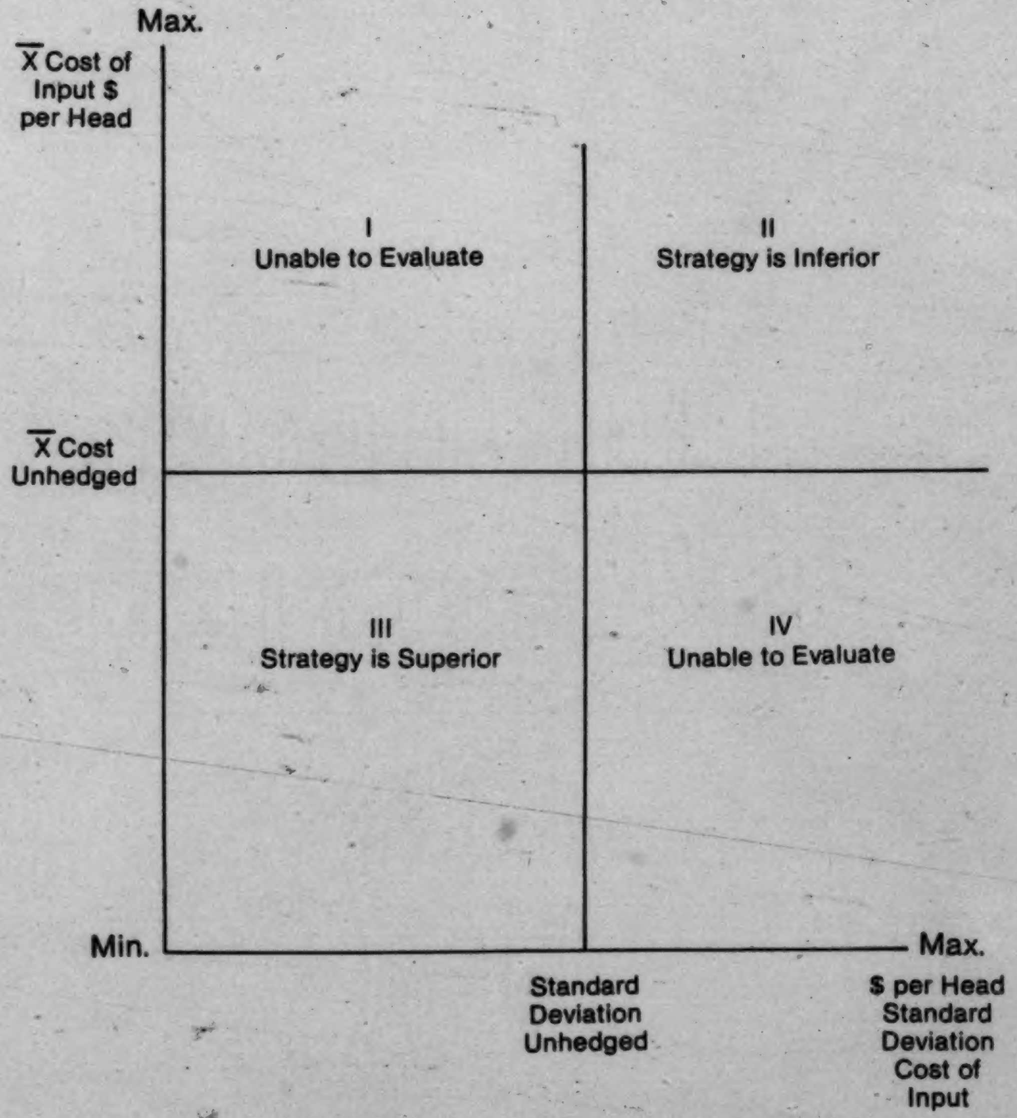
In the event that a strategy should fall in either quadrants II or III then it is not possible to determine if a strategy is superior or inferior since such a decision depends on the hedger's response to risk on the assumption that the greater the standard deviation of returns, the greater is the risk of uncertainty to the producer. It should be noted, that in quadrant II the producer is receiving a higher mean return for the increase in risk. On the other hand, should a strategy fall in quadrant III the producer is paying for a reduction of the risk by way of a lower mean return.

The foregoing method of analysis is used to evaluate the returns to the producer where the objective is to maximize the returns and minimize the standard deviation. In the case where one is hedging an input, the objective is to minimize the cost and minimize the standard deviation. Thus, in such a situation, the quadrants change in terms of being inferior or superior.

Figure 6.2 describes the method for evaluating the results of hedging an input. In figure 6.2 a strategy is superior if it should fall in quadrant III, which has a lower mean cost and a lower standard deviation. A strategy is inferior if it lies in quadrant II where it would have a higher standard deviation and higher mean cost. If a strategy should fall in either quadrants I or II, we would be unable to evaluate the strategy because of the trade off involved in the uncertainty (standard deviation) and the cost to the hedger.

The evaluation of the hedging of an output is the same as that shown in figure 6.1.

Figure 6.2: Evaluating the Hedging of an Input.


Max.
$\overline{X}$ Cost of Input $ per Head
I
Unable to Evaluate
II
Strategy is Inferior
$\overline{X}$ Cost Unhedged
III
Strategy is Superior
IV
Unable to Evaluate
Min.
Max.
Standard Deviation Unhedged
$ per Head Standard Deviation Cost of Input

Evaluation of Strategies which fall in quadrants I and IV are determined by a producer's reaction to risk.

Results of Hedging Strategies

The results of the various hedging strategies are listed in table 6.1 and are shown graphically in figure 6.3. The results of each strategy are discussed in more detail below.

Strategy I: No hedging. This stragegy was used to obtain a standard with which to evaluate the other hedging strategies. This strategy resulted in a mean income of $74.55 per head and a standard deviation of $29.83 per head. Income for a feeding period ranged from a low of $30.29 per head to a high of $183.23 per head.

Strategy II: Routine Hedging. This strategy resulted in a mean income of $71.06 per head. The standard deviation was $77.54 per head. The level of income ranged from a low of minus $68.29 to a high of $358.43 per head. The contribution by each hedge was as follows: finished cattle hedge minus $11.64 per head, feeder cattle hedge $12.97 per head, barley hedge minus $4.82 per head.

Strategy III: Hedge feeder cattle only. This strategy resulted in a mean income of $87.52 per head. The standard deviation was $58.53 per head. The level of income ranged from a low of minus $2.73 per head to a high of $325.01 per head.

Strategy IV: Hedge barley only. This strategy resulted in a mean income of $69.72 per head. The standard deviation was $33.02 per head. The level of income ranged from a low of $20.77 per head to a high of $197.17 per head.

Strategy V: Hedge finished cattle only. This strategy resulted in a mean income of $62.91 per head. The standard deviation was $53.96 per head. The level of income ranged from a low of minus $111.95 per head to a high of $186.90 per head.

Table 6.1

RESULTS OF HEDGING STRATEGIES

	Dollar Return per Head	
Strategy	Mean	Standard Deviation
I	74.55	29.83
II	71.06	77.54
III	87.52	58.53
IV	69.72	33.02
V	62.91	53.96
VI	74.40	44.95
VII	80.61	63.47
VIII	81.66	40.44

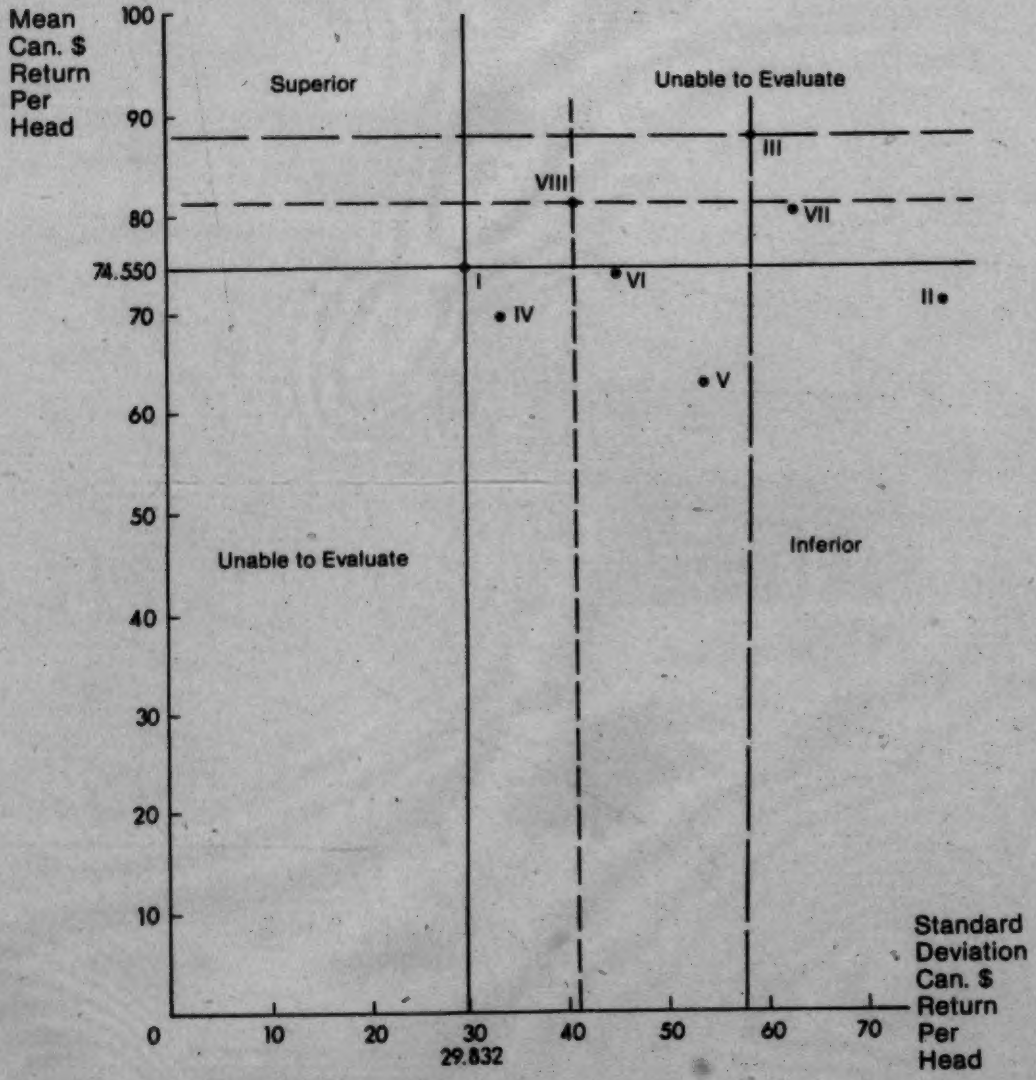


Figure 6.3: Results of Hedging Strategies in this Study.

Strategy VI: Hedge finished cattle when the current futures price is greater than, or equal to, the current cash price. Hedge feeder cattle when the current futures price is less than, or equal to, the current cash price. Hedge barley when the current futures price is less than, or equal to, the current cash price, This strategy resulted in a mean income of $74.40 per head. The standard deviation was $44.95 per head. The level of income ranged from a low of minus $83.57 per head to a high of $183.23 per head. The contribution by each hedge was as follows: finished cattle hedge $0.26 per head; feeder cattle minus $0.41 per head; barley hedge $0.00 per head.

Strategy VII: Hedge finished cattle when the current basis is less than the mean of the basis. Hedge feeder cattle when the current basis is greater than the mean of the basis. Hedge barley when the current basis is greater than the mean of the basis. This strategy resulted in a mean income of $80.61 per head. The standard deviation was $63.47 per head. The level of income ranged from a low of minus $68.29 per head to a high of $338.95 per head. The contribution by each hedge was as follows: finished cattle hedge minus $9.27 per head; feeder cattle hedge $13.30 per head; barley hedge $2.03 per head.

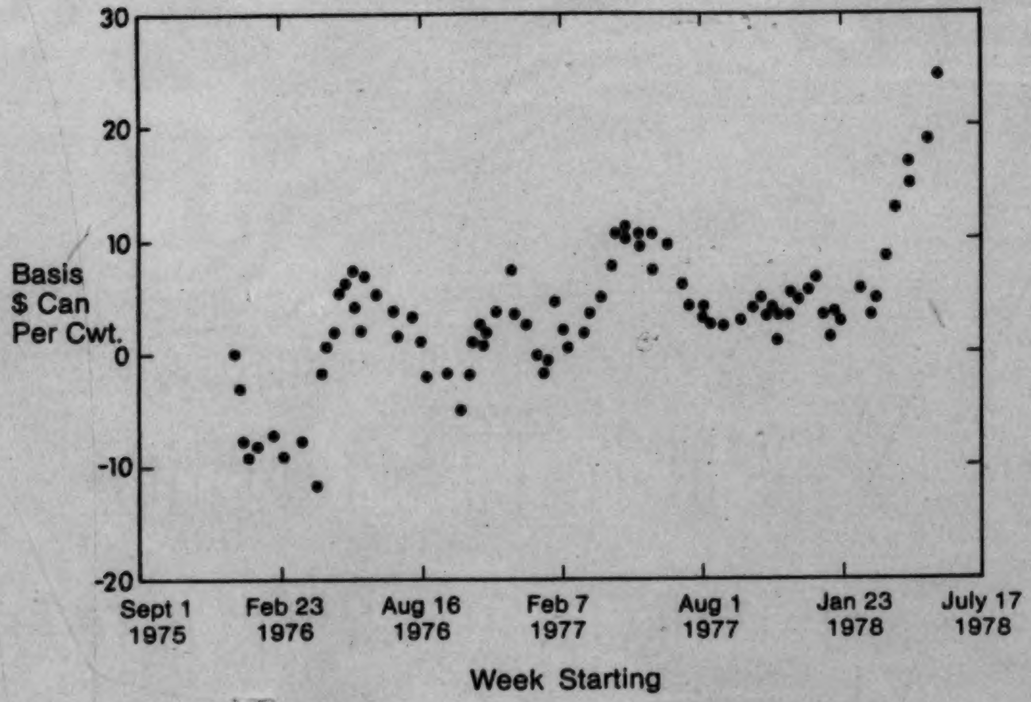
Strategy VIII: Hedge finished cattle when the current basis is less than the mean of the basis minus one standard deviation. Hedge feeder cattle when the current basis is greater than the mean of the basis plus one standard deviation. Hedge barley when the current basis is greater than the mean of the basis plus one standard deviation. This strategy resulted in a mean income of $81.66 per head. The standard deviation was $40.44 per head. The level of income ranged from a low of $7.77 per head to a high of $226.02 per head. The contribution by each hedge was as follows: finished cattle hedge $0.39 per head; feeder cattle hedge $5.34 per head; barley hedge $1.38 per head.

Analysis of Basis for Hedges

The importance of the basis was discussed in chapter IV. Therefore, in order to interpret the results of this study, the influence which the basis had on our results must be assessed. Figures 6.4 and 6.5 are graphs of the basis for the Chicago live cattle contract and for the profit or loss from the live cattle hedge. The relationship between these two groups is difficult to assess. For example, there would appear to be a direct relationship during the weeks of 992 to 1025; there would also appear, however, to be an inverse relationship at the week of 1050. Turning now to figure 6.4 (Calgary Basis Live Cattle) and figure 6.10 (Canadian U.S. Dollar Exchange Rate) it will be noted that graphs move in an upward direction on the right side. The movement in fugure 6.4, however, is not as smooth as is the case in figure 6.10.

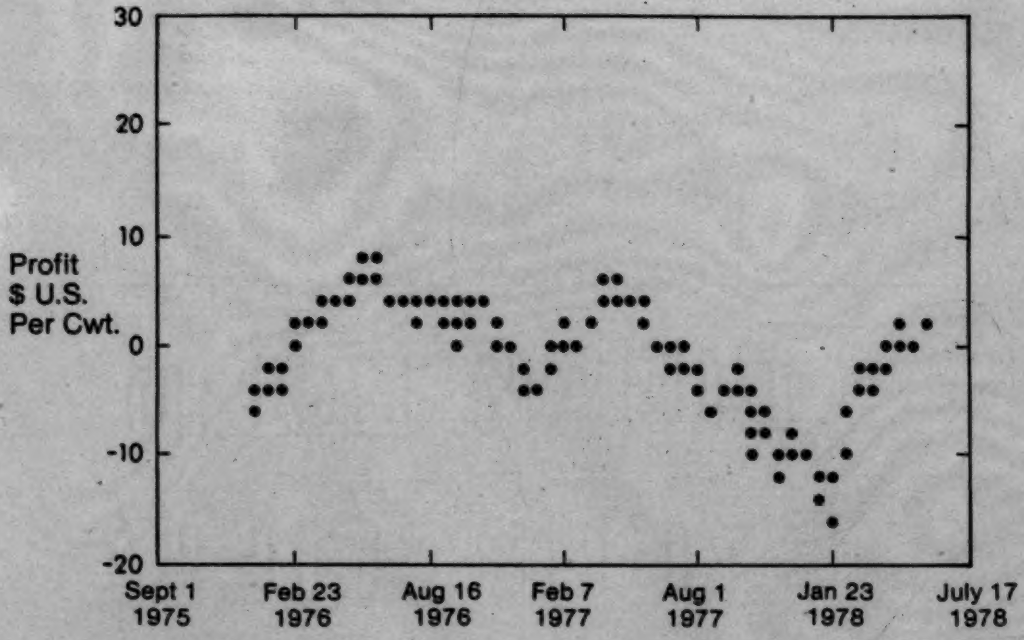
These three graphs indicate that the profit and loss on the live cattle hedge was affected to a large extent by changes in the basis and by changes in the exchange rate, as would be expected. The relationship between these three factors, however, does not appear to be readily definable and, thus, is somewhat unpredictable.

Figures 6.6 and 6.7 are graphs of the basis for Chicago feeder cattle and the profit or loss on the feeder cattle hedge respectively. It will be noted that, in these cases, there is a direct relationship between the basis and the profit or loss on the hedge. Although the relationship is not as pronounced as in the previous case, these results would nevertheless support the theory which was outlined in chapter IV.



Mean	3.9400
Standard Deviation	6.1804
Range	35.8583
Minimum	−12.8178
Maximum	23.0405

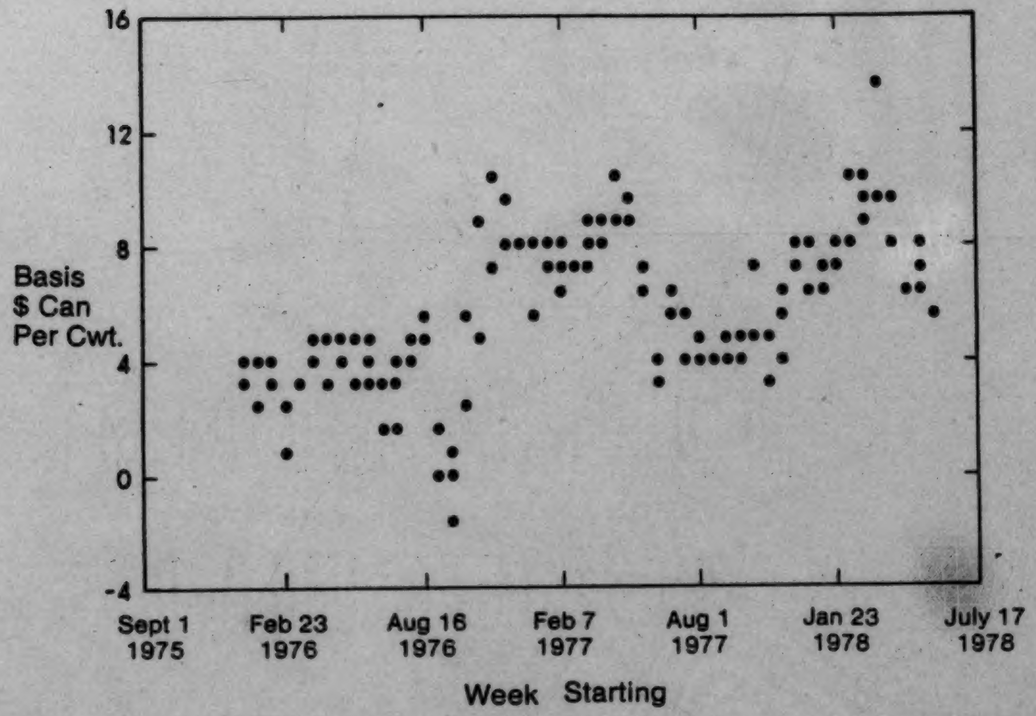
Figure 6.4: Calgary Basis Chicago Live Cattle



Week Starting

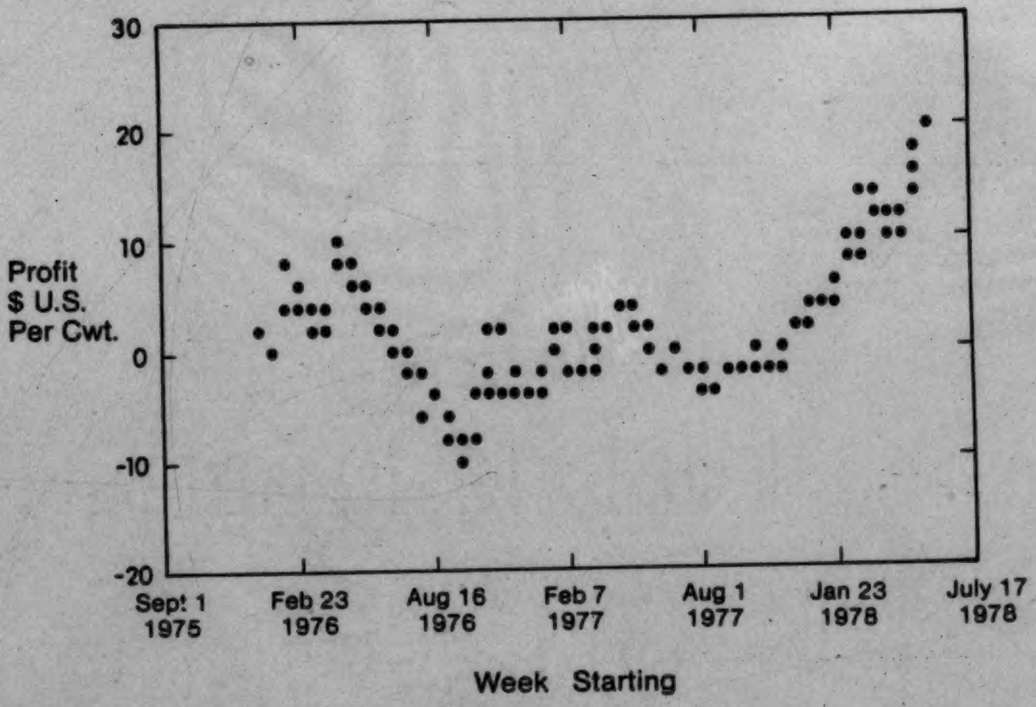
Mean	−0.906
Standard Deviation	5.178
Range	24.630
Minimum	−16.130
Maximum	8.50

Figure 6.5: Profit or Loss on Live Cattle Hedge



Mean	5.668
Standard Deviation	2.617
Range	14.722
Minimum	− 1.407
Maximum	13.315

Figure 6.6: Calgary Basis Chicago Feeder Cattle



	1.645
Mean	5.594
Standard Deviation	30.950
Range	−10.940
Minimum	20.010
Maximum	

Figure 6.7: Profit or Loss on Feeder Cattle Hedge

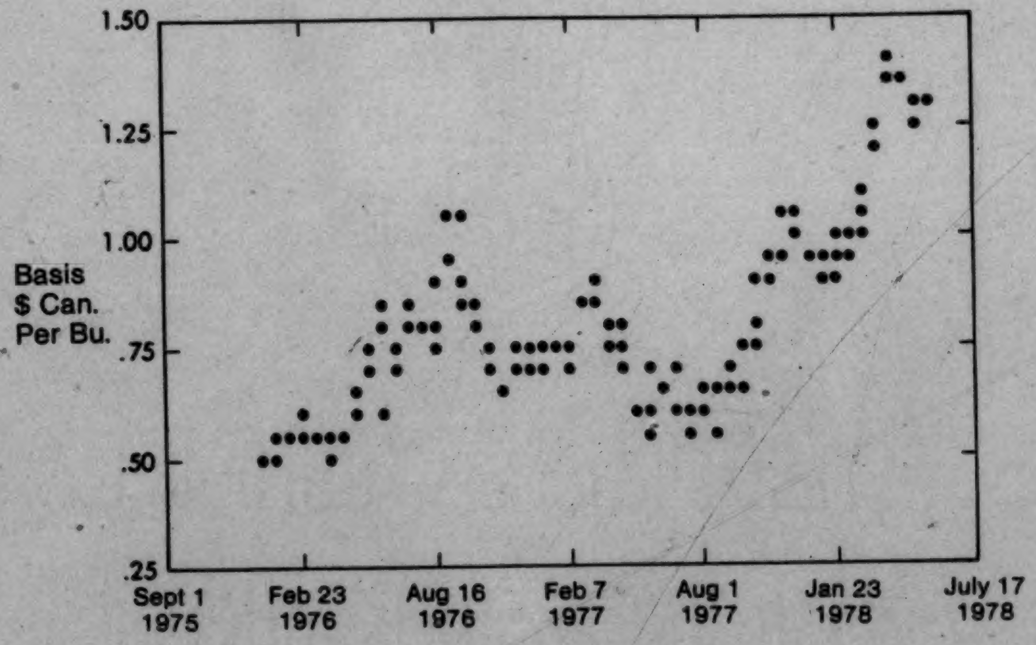
In comparing figures 6.7 (profit and loss on feeder futures hedge) with figure 6.10 (Canadian - U.S. dollar, exchange rate), there appears to be a very strong relationship between the profit or loss on the feeder cattle hedge and the exchange rate. This would suggest that Alberta is on an export basis for feeder cattle with respect to the U.S., and that the Calgary price is responsive to shifts in the Canada - U.S., Exchange rate.

Turning now to figure 6.8 (Basis Chicago Corn Futures) and figure 6.9 (profit or loss on corn hedge), one will note that there is a pronounced relationship between the basis and the profit or loss on the hedge. When one compares these graphs with the graph in figure 6.10 (Canadian - U.S. Exchange rate) one again notes the relationship between the three graphs. This is expected in view of the fact that the price of barley is based upon the U.S. price for corn adjusted by the exchange rate.

Analysis of Basis by Contract Month

The contracts traded for a particular commodity may differ in terms of their variation of the basis. This difference needs to be identified in order that the producer may choose the contracts which are subject to the least variation in basis.

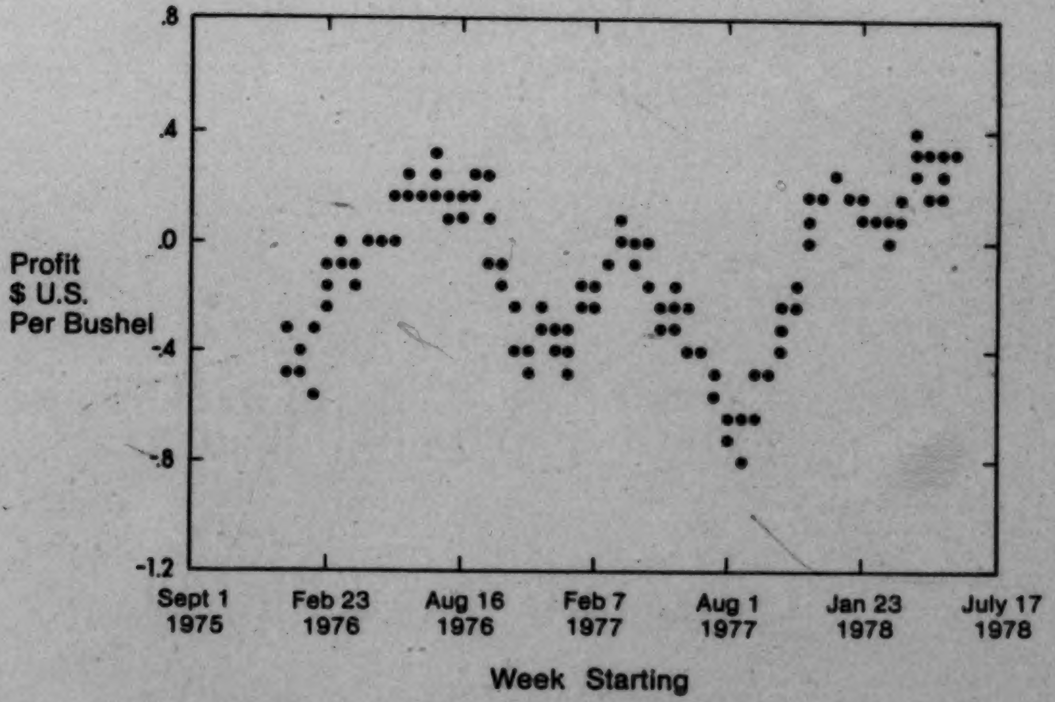
Table 6.2 lists in column one the contracts traded for Chicago live cattle at the time of this study. Column two and three lists the mean and the standard deviation, respectively, for each contract. The interpretation of this table indicates that there are seasonal factors which affect the basis. For example, the February and December contracts are subject to the widest variation in basis, as evidenced by the



Week Starting

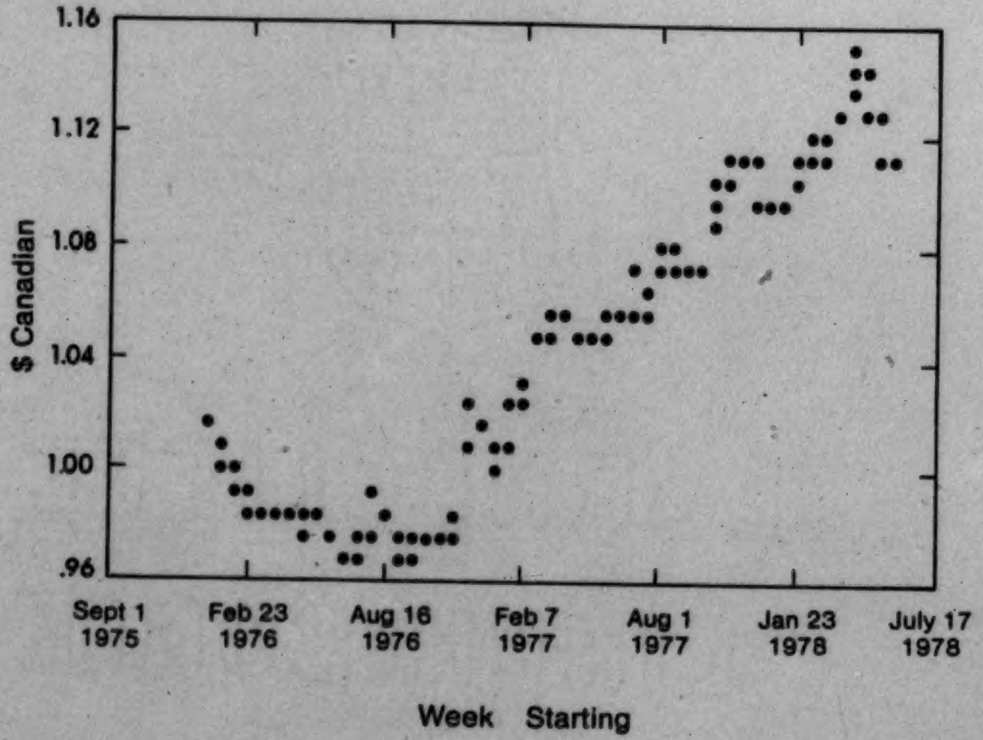
Mean	0.797
Standard Deviation	0.216
Range	0.921
Minimum	0.482
Maximum	1.403

Figure 6.8: Calgary Basis Chicago Corn Futures



Mean	−0.106
Standard Deviation	0.271
Range	1.132
Minimum	−0.763
Maximum	0.369

Figure 6.9: Profit or Loss on Corn Futures



Mean	1.041
Standard Deviation	0.055
Range	0.187
Minimum	0.967
Maximum	1.154

Figure 6.10: Canadian U.S. Dollar Exchange Rate
U.S. Dollars ($ Canadian)

Table 6.2

CALGARY BASIS CHICAGO LIVE CATTLE BY CONTRACT MONTH

$ CANADIAN PER CWT.

Contract Month	Mean	Standard Deviation	Range	Minimum	Maximum
January	0.446	2.436	9.217	-4.078	5.139
February	2.931	3.725	17.070	-4.993	12.077
April	2.615	3.146	14.125	-4.949	9.176
June	3.924	3.100	14.560	-4.276	10.284
August	3.694	2.998	14.752	-5.617	9.135
October	3.427	3.382	17.341	-7.596	9.745
December	3.783	3.606	18.608	-7.350	11.258

higher standard of deviation for these two contracts. The January contract, on the other hand, appears to be the most stable of the contracts in terms of the variation in basis. This is evidenced by the lowest standard deviation of all the contracts. The remaining four contracts all appear to be fairly consistent in terms of the variation in the basis. The results would indicate that all of the contracts traded are suitable for hedging.

Table 6.3 lists the contracts traded for feeder cattle. In column two and three the mean and the standard deviation are listed respectively for each contract. These results indicate that the May contract is the least susceptible to variation in the basis, as evidenced by the lower standard deviation. In addition, the results indicate that a producer can use all of the feeder cattle contracts to hedge.

Table 6.4 lists the same results for the Chicago corn futures that were given for the previous two commodities. It is interesting to note that, during the closed navigation season, the March contract adjusted by the exchange rate is used to price Canadian barley,[2] a fact which would suggest that since the basis has been adjusted by the exchange rate, the standard deviation would be approximately zero. This conclusion is supported by the results in table 6.4 which show that the March contract basis has a standard deviation of .166. The remaining contracts are subject to a consistent variation in the basis, although this variation is somewhat higher than the variation in the March contract.

---

[2] Coffin, H.G. "The Case for Formula Pricing of Canada's Feed Grains," Canadian Journal of Agricultural Economics: Canadian Agricultural Economists Society Workshop Proceedings, March, 1977, p. 65.

Table 6.3

CALGARY BASIS CHICAGO FEEDER CATTLE BY CONTRACT MONTH

$ CANADIAN PER CWT.

Contract Month	Mean	Standard Deviation	Range	Minimum	Maximum
January	6.889	2.430	12.080	0.886	12.966
March	5.924	2.601	9.686	0.058	9.744
April	7.067	2.554	12.628	0.687	13.315
May	6.905	2.195	11.538	0.786	12.324
August	6.443	2.563	11.571	0.472	12.043
September	5.973	2.793	12.879	-1.095	11.784
October	5.550	2.720	12.550	-1.407	11.143
November	5.725	2.725	12.161	-0.534	11.627

Table 6.4

CALGARY BASIS CHICAGO CORN FUTURES BY CONTRACT MONTH

$ CANADIAN PER BU.

Contract Month	Mean	Standard Deviation	Range	Minimum	Maximum
March	0.797	0.166	0.743	0.482	1.225
May	0.866	0.204	0.903	0.500	1.403
July	0.879	0.215	0.921	0.488	1.409
September	0.837	0.228	1.006	0.405	1.411
December	0.808	0.234	1.031	0.418	1.449

CHAPTER VII

CONCLUSIONS, RECOMMENDATIONS AND SUMMARY

Conclusions

In chapter one, we formulated a hypothesis that the results of this study would indicate that "an Alberta feedlot operator can increase the level and the stability of his income through the effective use of futures markets. Based upon the results of this study, the primary conclusion is that an Alberta operator can increase his income level, but in doing so, he would incur a greater degree of instability. In particular the employment of strategy III (Hedge feeder cattle only) would have increased income by $12.97 per head (after allowing $30.00 per contract for commission). In doing so the degree of instability as measured by the standard deviation increased from $29.83 per head to $58.53 per head.

The second conclusion of this study is that for the Chicago live cattle contract, the Calgary basis is subject to unpredictable variation. The results of this study support the theory outlined in chapter IV that the Calgary basis is free to fluctuate by the amount of Canadian tariffs + transfer costs to Canada + U.S. tariffs + transfer costs to the U.S. This variation in the basis is in addition to the variation due to fluctuations in exchange rates, a fact which then implies that hedging the exchange rate will only protect a Canadian producer from a portion of the variation in the Calgary basis for live cattle. The results of this study would also indicate that the only solution for a

Canadian producer is to monitor the basis daily, and lift his hedge when the basis shifts unfavorably, and replace the hedge should the basis shift in favor of the producer. Such a strategy would incur additional costs to the producer.

With regard to feeder cattle, the results of this study, would indicate that Alberta is on an export basis. The price for feeder cattle is approximately equal to the U.S. price (in Canadian dollars) minus U.S. tariff minus transfer costs. The Edmonton price for feeder cattle is extremely sensitive to changes in the U.S. price and the exchange rate. The results of this study indicate that the Edmonton price for feeder cattle adjusts automatically for changes in the exchange rate in such a manner, that the Calgary basis is a function of the exchange rate and the U.S. price. Further research of this area, however, is needed.

The major question, then, becomes, "should a Canadian producer hedging feeder cattle hedge the Canadian - U.S. exchange rate?" In strategy III routine hedging of feeder cattle resulted in producer income increasing $12.97 per head. It is entirely possible that by hedging the exchange rate this increase would have been greater; in doing so, however, there would have been additional costs incurred by the producer. Again, further research of this area is required.

In the case of barley, the results of this study confirm that there is a relationship between Calgary barley, U.S. corn price, and the exchange rate, such that the Calgary basis is not subject to any abnormal variation. Strategies VII and VIII indicate that the Calgary basis for the Chicago corn contract is sufficiently consistent that a producer could increase his income by $2.03 per head and $1.38 per head respectively. It is possible that a higher profit would have resulted had the exchange rate been hedged. Again, this would have incurred additional cost to the producer, and we would suggest that this alternative should be studied further.

To summarize, the second conclusion of this study is that certain contracts offer a greater potential for hedging. In particular the hedging of feeder cattle and barley did produce significant higher levels of producer income. The hedging of finished cattle with the Chicago live cattle contract, however, is highly unpredictable and therefore should be approached with extreme caution by any producer contemplating its use.

The third conclusion of this study is that the basis tends to be relatively constant for feeder cattle and barley in the closing weeks of the contract. It was originally hypothesized that the basis would shift during the period of the hedge, and that, in the case of feeder cattle and barley, if the current basis was less than the mean of the basis, any shift in the basis would benefit the producer. This strategy would have resulted in decreased income by $0.33 per head in the case of feeder cattle, and $6.86 per head in the case of barley. Thus, it can be concluded that in the case of feeder cattle and barley, if the current basis is to the right of the mean, it will remain there during the period of the hedge.

In the case of finished cattle this conclusion is not necessarily true. It was originally hypothesized that if the current basis was greater than the mean of the basis, then any shift in the basis would benefit the producer. This strategy was tested, and it resulted in a loss of $2.37 per head versus a loss of $9.27 per head if the current basis was less than the mean of the basis. Thus, neither strategy produced a positive result, a face which would confirm the previous conclusion that the live cattle contract is subject to unpredictable shifts in the Calgary basis.

The bias reported in the study by Leuthold[3] is supported by this study. Strategy VI assumed that the current futures price was a better indicator of the future cash price than was the current cash price. Strategy VI resulted in a mean return to the producer of $74.40 versus $74.55 for the unhedged strategy. The hedge was placed during the twentieth week prior to the end of trading for a contract and lifted during the third week prior to the end of trading. Thus, the futures price during twenty weeks of trading for a contract moved in accordance with the cash price.

Certain strategies offer greater potential for hedging than do others. In particular Strategy I was superior to strategies II, IV, V, VI. Strategies III, VII, VIII could not be evaluated in terms of their superiority over strategy I. Thus, the ultimate decision lies with the individual producer's evaluation of returns versus risk. Strategies III and VIII were superior, however, to strategy VII, as indicated in figure 6.3

Contract Specifications

Before concluding this study there are a number of topics which, although not directly related to this topic, nevertheless warrant discussion.

---

[3] Leuthold, R.M. "The Price Performance on the Future Market of a Nonstorable Commodity Live Beef Cattle," Selected Writings on Futures Markets. Edited by A. Peck, (Chicago Board of Trade, 1977), p.382.

A futures contract specifies the grade, quantity, etc., of the product which is being traded. Thus, a producer may have a quantity which is greater or less than the total quantity specified in his contracts. For example, a feeder cattle contract specifies 42,000 lbs., but suppose a cow calf producer has 500 head of feeders which have a total weight of 325,000 lbs. If the producer should buy eight contracts, then he would be overhedged by 11,000 lbs. (336,000 - 325,000); and should he buy only seven contracts, then he would be underhedged by 31,000 lbs. (294,000 - 325,000). Thus, in the case that a producer had eight contracts, and the future price decreased by 10¢ during the period of the hedge, the producer would incur an $11,000 loss without any offsetting profit from the sale of cattle.

A second consideration for a Canadian producer is that the grades specified in the contract are U.S. grades. These grades for the most part do not correspond to Canadian grades; thus, an increase in the futures price may not be matched by an equal rise in Canadian cash price.

These factors, although not crucial, should, nevertheless, be remembered by any producer contemplating hedging.

Government Intervention

As was outlined in chapter V a longer time period was not used because of import controls in Canada and the United States prior to August, 1975. The imposition of either import or export controls, or both, tends to distort the relationship between Canadian and U.S. cattle prices as described in chapter IV. Such a distortion could result in a rapid change in U.S. futures price without a corresponding change in Canadian cash prices. In the event that such a situation should arise, it is strongly recommended that all hedges be immediately lifted.

A Note of Warning

It is a relatively easy matter to become involved in commodity trading. For example an individual buying or selling a feeder cattle contract at 70¢/lb. has a contract for 42,000 lbs. which has a face value of $29,400. In order to purchase such a contract an individual would require an initial investment of only $1,200. (4.1% of the face value) at the time of this writing. Thus, a 4.1% change in the price of the commodity would result in a 100% profit or loss, depending, of course, on the direction of the price change and the initial position (long or short). In terms of actual price, a 2.9¢/lb. change in one direction or the other, would produce a 100% profit or loss. In the case of feeder cattle this is not a significant price change, and could occur in a matter of days.

In other words, the potential for profit may become so attractice, that a bona fide hedger may become a speculator. If such is the case, the individual should remember that he is now in an extremely risky position where fortunes can be, and are, made or lost in a few days.

In addition, such an individual should remember that if an adverse price change should occur, the speculator would receive margin calls, which, if not met, would result in the liquidation of his contracts until sufficient funds are recovered to meet the remaining margin calls. Thus, an adverse price change could result in large losses regardless of whether or not the price should later reverse itself.

Financial Requirements

Even in the case of a bona fide hedger, an adverse change would result in margin calls. In order to meet such calls a hedger may require substantial cash reserves. Most feedlot operators do not have such a reserve of cash for utilization in a time of need. Therefor, a hedger must have made prior financial arrangements which will enable him to meet his margin calls. This implies that he must have an understanding banker who fully comprehends and understands his need and is prepared to meet his margin calls should they arise.

Bias in the Future's Market

Raymond Leuthold, in his article "The Price Performance on the Futures Market of a Nonstorable Commodity Live Beef Cattle," examined the bias in the live cattle futures price and corn future price. He concluded that "for distant futures the cash price is a more accurate indicator of future cash prices than is the futures price".[4] In particular, he found that only after the fifteenth week prior to delivery did the futures price become a reasonable forecase of the cash price at the time of delivery.

In this present study, the next contract which had a delivery date after the feeding period was used to place the hedge. Thus, the bias reported by Leuthold was incorporated into this study.

The results of this study might have been different had contracts with a later delivery date been used.

Bias in This Study

This study used data from a particular time period. Had a different time period been chosen, the results might well have been different.

---

[4] Ibid. p.382

This would especially have been true, had a period been chosen prior to September 1975, when government intervention distorted the price relationship outline in chapter IV. Thus, this study can only be considered to be indicative of the results which would be obtained over a longer period of time.

Recommendations for Further Studies

The results of this study would indicate that the fluctuations in exchange rate have a major bearing on the net return received by a producer. The obvious solution to this problem is to protect the producer against fluctuations in the exchange rate by hedging the Canadian dollar against such fluctuations. Therefore, the first recommendation is that further study is required in order to fully assess the effect which hedging the exchange rate would have on producers returns.

The subject of hedging and futures trading is not understood nor is it utilized, in Canadian agriculture to the extent that it has in the United States. This fact is exemplified by the general lack of knowledge of this subject which is displayed by the Canadian chartered banks. Therefore, the second recommendation of this study is that a general program of education concerning this subject be undertaken in the agri-business community.

Before concluding, there remains one final recommendation which needs to be made. This study touched on only one particular commodity. Further research is required, not only in the matter of Canadian hedging on the U.S. futures market, but also, on the problems of hedging on the Canadian futures markets. The fact that a Canadian producer must use a U.S. futures market introduces unnecessary complicacy into the matter.

Therefore, the final recommendation of this study is that the role of the Canadian futures markets and the contracts offered should be re-examined and possibly redefined.

Summary

At the outset of this study certain objectives were defined. In chapter II the mechanics of hedging for a beef producer for each of the different contracts employed in this study was explained. Chapter four and chapter six analyzed the relationship between the different futures contracts employed in this study and their respective Calgary cash price. In addition, chapter six developed a number of hedging strategies and calculated the effect that each strategy would have on producer income for a Calgary feedlot. Based on these results certain conclusions, as outlined at the beginning of this chapter, were drawn.

Thus, the objectives of this study, as outlined at the beginning, have been fulfilled. In doing so, it is possible that more questions have been posed than have been answered. If this is the case, it was not our intention to do so. It was intended, however, to initiate further study of an area which, in the opinion of the author, has not been explored to a sufficient degree in Canada. It is hoped that this study will be of use, not only to cattle producers, but to fellow researchers for devising further research of this area.

BIBLIOGRAPHY

1. Arthur, Henry B. *Commodity Futures as a Business Management Tool.* Boston: Division of Research Harvard Business School, 1971.

2. Baer, J.B., and Saxon, O.G. *Commodity Exchange and Futures Trading.* New York, New York: Harper Bros., 1949.

3. Bakken, H., (Ed.) *Futures Trading in Livestock--Origins and Concepts*. Madison, Wisconsin: Mimir Publishers Inc., 1970.

4. Birch, A.L. "An Econometric Analysis of the Tariff in Canadian American Cattle Trade." Unpublished Master of Science Thesis, University of Alberta, Spring, 1975.

5. Bobst, B.W. *Effects of Location Basis Variability on Livestock Hedging in the South*. Agricultural Experiment Station, University of Kentucky Research Report #20, July, 1974.

6. Brand, S. "The Decline in the Cotton Futures Market." *Food Research Institute Studies*, IV, No. 3 (1964), 225-72.

7. Brinegar, C.S. "A Statistical Analysis of Speculative Price Behavior." *Food Research Institute Studies*, IX, Supplement (1970)

8. Canada Department of Agriculture. *Annual Livestock Market Review*. Ottawa: Queen's Printer, 1975-1979.

9. Canada Department of Agriculture. *Canada Livestock And Meat Trade Report*. Ottawa: Production and Marketing Branch, 1975-1979.

10. Canada Federal Task Force on Agriculture, 1969. *Canadian Agriculture in the Seventies*. Ottawa: Queen's Printer, 1969.

11. Canada Statistics. *Livestock and Animal Products Statistics*, 23-203 Ottawa: Statistics Canada, 1975-1979.

12. Canada Statistics. *Farm Cash Receipts*, 21-001. Ottawa: Statistics Canada, 1976

13. Canada Department of Agriculture. *Quarterly Bulletin of Agricultural Statistics*, Cat. No. 21-003. Ottawa: C.D.A., 1975-1979.

14. Canadian Federation of Agriculture. "Submission to the Standing Committee on Agriculture on Beef Stabilization." Unpublished paper.

15. Candler, W. and Kennedy, G. "A Graphical Analysis of Spot Price Stabilization Using Futures." *Canadian Journal of Agricultural Economics*, Volume 22, #1 (Feb, 1974), p 1-11.

16. Carter, C.A., "An Evaluation of Inter-Temporal Price Relationships in the Winnipeg Rapeseed Futures Market." Unpublished Master of Science Thesis, University of Alberta, Edmonton, Alberta, Spring, 1976.

17. Commodity Trading Manual. Chicago, Illinois: Chicago Board of Trade, 1976.

18. Chicago Mercantile Exchange. Futures Trading in Livestock Origins and Concepts. Chicaog, Illinois: Chicago Mercantile Exchange, 1970.

19. Chicago Board of Trade, Futures Trading Seminar. Chicago, Illinois: Chicago Board of Trade, 1978.

20. Chicago Mercantile Exchange. Yearbook. Chicago: Chicago Mercantile Exchange, Market News Department, 1974-1979.

21. Coffin, H.G., "The Case for Formula Pricing of Canada's Feed Grain." Canadian Journal of Agricultural Economics: Canadian Agricultural Economics Society Workshop Proceedings, March, 1977, p 47-65.

22. Commission of Inquiry into the Marketing of Beef and Veal. Report. Supply and Services Canada, Ottawa 1976.

23. Commodity Exchange Authority, Trading in Live Beef Cattle Futures. U.S. Department of Agriculture, Washington D.C. 1970.

24. Cootner, P.H., "Speculation and Hedging." Food Research Institute Studies, VII, Supplement (1967), 65-106.

25. Crow, R.J., Riley, J.B., and Purcell, W.D. "Economic Implications of Nonpar Delivery Points for the Live Cattle Futures Contract." American Journal of Agricultural Economics, LIX (1972), 111.

26. Doll, J.P., Rhodes, J.V., and West, J.G. Economics of Agricultural Production Markets and Policy. Homewood, Illinois: Richard D. Irwin, Inc., 1968

27. Enrich, R.L. "Cash-Futures Price Relationships for Live Beef Cattle." American Journal of Agricultural Economics, 51, No. 1 (February, 1969), p 26-40.

28. Elder, A.E. Risk, Uncertainty and Futures Trading. Staff Paper Series, No. P. 69020, Department of Agricultural Economics, University of Minnesota, August, 1969.

29. Emerson, P.M., and Tomek, W.G. "Did Futures Trading Influence Potato Prices?" American Journal of Agricultural Economics, 51, No. 3 (August, 1969), 666-72.

30. Erickson, S.P. Selective Hedging Strategies for Cattle Feeders. Illinois Agricultural Economics, January, 1978, Vol. 18, #1, p 15-20.

31. Ferguson, C.E. Microeconomic Theory. Homewood, Illinois: Richard D. Irwin, Inc., 1969

32. Fox, K.A. and Johnson, D.G. Readings in the Economics of Agriculture, Vol XIII, Homewood, Illinois: Richard D. Irwin, Inc., 1969.

33. Gold, G. Modern Commodity Futures Trading, 5th (revised) edition. New York: N.Y. Commodity Research Bureau, 1971

34. Gray, R.W. "Risk Management in Commodity and Financial Markets." American Journal of Agricultural Economics. Vol. 58, #2, (May, 1976), p 280-285.

35. Gray, R.W. "The Importance of Hedging in Futures Trading: and the Effectiveness of Futures Trading for Hedging." Futures Trading Seminar, Vol. 1. Madison, Wisconsin: Mimir Publishers Inc., 1960.

36. Gray, R.W. "The Relationship Among Three Futures Markets." Food Research Institute Studies, II, No. L (February, 1961), p 21-32.

37. Gray, R.W. "The Search for a Risk Premium." Journal of Political Economy, LXIX, No. 3 (June, 1961), p 250-60.

38. Gray, R.W. "The Attack on Potato Futures Trading in the United States." Food Research Institute Studies, IV, No- 2 (1964), p 97-121.

39. Gray, R.W.: Rutledge, J.S. "The Economics of Commodity Futures Markets: a Survey." Review of Marketing and Agricultural Economics, Volume 39, #4, (Dec. 1971), p. 57.

40. Gum, R.; Wildermuth, J. "Hedging on the Live Cattle Futures Contract." Agricultural Economics Research, XXII (1970), 104

41. Hardy, C.O. Risk and Risk Bearing. Chicago: University of Chicago Press, 1923.

42. Hawkins, M.H. "A Study of Canadian Cattle Prices and Price Spreads." Unpublished Master of Science Thesis, University of Alberta, Edmonton, Alberta, August, 1964.

43. Hawkins, M.H., and Huranen, R.R. Beef Cattle Marketing Problems in Alberta. Edmonton, Alberta: University of Alberta, Department of Agricultural Economics, 1970.

44. Heifner, R.G. "Optimal Hedging Levels and Hedging Effectiveness in Cattle Feeding." American Economics Research, Vol. 24, #2, (April, 1972) p 25-36.

45. Heifner, R.G. "The Gains from Basing Grain Storage Decisions on Cash-Future Spreads." Journal of Farm Economics, Vol 48, #5 (Dec. 1966) p 1490-1495.

46. Hellwig, Z. Linear Regression and Its Application to Economics. London: Dergamon Press, 1963.

47. Helmuth, J.W. "Futures Trading Under Conditions of Uncertainty." PHD Dissertation, University of Missouri, Columbia, Missouri, August, 1970.

48. Hieronymus, Thomas A. Economics of Futures Trading. New York: Commodity Research Bureau, Inc., 1971.

49. Hoffman, G.W. Grain Prices and the Futures Markets. Washington, D.C.: USDA Technical Bulletin, No 747, January, 1941.

50. Irwin, H.W. Evolution of Futures Trading Madison, Wisconsin: Mimir Publishers, Inc., 1954

51. Jones, D.L. "Theory of Hedging on the Beef Futures Market." American Journal of Agricultural Economics. Vol. 50, #5 (Dec., 1968), p 1760-1766.

52. Kaldor, N. "Speculation and Economic Stability." Review of Economic Studies, VII (1939-40), p 196-201.

53. Kaldor, N. "A Note on the Theory of the Forward Market." Review of Economic Studies, VII (1939-40), p 196-201.

54. Kenyon, D.E., and Shapiro, N.P. The Ability of the Futures Market to Forecast Profit Margins in the Broiler Industry. Blacksburg, Virginia: Department of Agricultural Economics, Virginia Polytechnic Institute and State University, August, 1976.

55. Keynes, J.M. "Some Aspects of Commodity Markets." Manchester Guardian Commercial, European Reconstruction Series, Section 13 (March 29, 1923), p 784-6.

56. Keynes, J.M. A Treatise on Money, Vol. II. New York: Harcourt, 1930.

57. Kmenta, J. Elements of Econometrics. New York, New York: Macmillan Publishing Co. Inc., 1971.

58. Kost, W.E. Effects of an Exchange Rate Change on Agircultural Trade Agricultural Economics Research Vol. 28, No. 3, (July, 1976) p 99-106.

59. Kulshreshlta, S.N., and Wilson, A.G. "A Harmonic Analysis of Cattle and Hog Cycles in Canada." Canadian Journal of Agricultural Economics, Vol. 21, #2 (November, 1973), p 34-45.

60. Lermer, G. "The Futures Market and Farm Programs." Canadian Journal of Agricultural Economics, Vol. 16, #2, (July, 1968), p 27-30.

61. Leuthold, R.M. "The Price Performance on the Futures Market of a Nonstorable Commodity Live Beef Cattle", American Journal of Agricultural Economics, Vol. 56, #2, (May, 1974), p 271-278.

62. Lyster, L.M. "The Impact of the Canadian Wheat Board on the Western Canadian Feed Grain Market." Unpublished Master of Agriculture Paper, University of Alberta, Edmonton, Alberta, Fall, 1978.

63. Martin, L., Groenewegen, J., and Meilke, K. Commodity Futures Markets Hedging Opportunities for Ontario Pork Producers, Guelph, Ontario: School of Agricultural Economics and Extension Education, University of Guelph, January, 1976.

64. Martin, L.J., and Haack, R. "Beef Supply Response in North America." Canadian Journal of Agricultural Economics. Vol. 25, #3. (Nov. 1977), p 29-47.

65. Mason, R.D., Statistical Techniques in Business and Economics. Homewood, Illinois: Richard D. Irwin, Inc., 1978.

66. McKinnon, R.I. "Futures Markets, Buffer Stocks and Income Stability for Primary Producers." Journal of Political Economy, 75, No.6 (December, 1976), p 844-61.

67. McCoy, J.H., and Price, R.V. "Cattle Hedging Strategies." Kansas Agricultural Experiment Station Bulletin 591. Manhatten, Kansas: Kansas State University, August, 1975.

68. Merrill Lynch, Pierce, Fenner and Smith, Inc. To the Western Canadian Feedlot Operator. Chicago: 1970, Unpublished Study.

69. Myers, W.M. "Combining Statistical Techniques with Economic Theory for Commodity Forecasting." American Journal of Agricultural Economics, Volume 54, #5, (December, 1972), p 784-789.

70. O'Bryan, S.L., Bobst, B.W., and Davis, J.T. Factors Affecting Efficiency of Feeder Cattle Hedging in Kentucky, Staff Paper 43, Lexington, Kentucky: Department of Agricultural Economics, University of Kentucky, February, 1977.

71. Paul, A.B., Heifner, R.G., and Helmuth, J.W. Farmers' Use of Forward Contracts and Futures Markets. Washington, D.C.: U.S. Department of Agriculture Economic Research Service, Agriculture Economic Report No. 320, March, 1976.

72. Pavaskar, M.G. Hedging Efficiency of the Cotton Futures Market. Bombay, India: University of Bombay, 1968.

73. Peck, A. Selected Writings on Futures Markets, Vol. II, Edited by A. Peck. Chicago, Illinois: Chicago Board of Trade, 1977.

74. Powers, M.J. "Effects of Contract Provisions on the Success of a Futures Contract." Journal of Farm Economics, 49, No. 4 (November, 1967), p 833-43.

75. Proceedings of the Twelfth Alberta Cattlemen's Short Course Beef for Tomorrow. Faculty of Extension, and Faculty of Agriculture and Forestry. University of Alberta, Edmonton, Alberta, 1975.

76. Purcell, W.N. A Closer Look at the Long Feeder Cattle Hedge Commodity, Cedar Falls, Iowa, Vol. VII, #8, August, 1978, p34

77. Purcell, W.D. Agricultural Marketing Systems Co-ordinating Cash And Futures Prices. Reston, Virginia: Reston Publishing Company Inc., 1979.

78. Quantz, L.E. "An Evaluation of Futures Trading on the Winnipeg Live Finished Beef Contract." Unpublished Master of Science Thesis, Dept. of Agricultural Economics, University of Alberta, Edmonton, Alberta, Spring, 1973.

79. Quantz, L.E. and Hawkins, M.H. "Futures Trading: A Review". Canadian Journal of Agricultural Economics. Vol. 22, #2, (July, 1974), p 48-53.

80. Quirk, J.P. Intermediate Microeconomics Science Research Associate. Chicago, Illinois: Science Research Associates Inc., 1976.

81. Richardson, R.A., and Farris, P.L. "Farm Commodity Price Stabilization Through Futures Markets." American Journal of Agricultural Economics. Vol. 55, #2, (May, 1973) p 225-230.

82. Schafer, H.H. "The Determination of Basis Patterns and The Results of Various Hedging Strategies for Live Cattle and Live Hogs. Unpublished Master of Science Thesis, Department of Economics, Iowa State University, Ames, Iowa, 1974.

83. Schmittkeen, J.A. "An Economic Appraisal of Recent Commodity Market Performances." American Journal of Agricultural Economics, Volume 57, #5, (December, 1975) p 863-865.

84. Skadberg, J.M. and Futrell, G.A. "An Economic Appraisal of Futures Trading in Livestock." Journal of Farm Economics, 48, no. 5 (December, 1966), p 1485-9.

85. Snape, R.H., and Yamey, B.S. "Test of the Effectiveness of Hedging." Journal of Political Economy, LXIII, No. 5 (October, 1965), p 540-4.

86. Stein, J.L. "The Simultaneous Determination of Spot and Futures Price." American Economic Review, Dec., 1961, p 1012-1025.

87. Storey, G.G., and Martin, L. "A Preliminary Paper on the Role and Importance of Futures Markets to Canadian Agriculture." Food Prices Review Board Reference Paper, No. 1, Ottawa, Ontario, 1975.

88. Taylor, C.H. History of the Board of Trade of the City of Chicago. Chicago: Robert O. Law Co., 1917.

89. Telser, L.G. "The Supply of Speculative Services in Wheat, Corn and Soybeans." Food Research Institute Studies, VII, Supplement (1967), p 131-76.

90. Teweles, R.J., Harlow, C.V., and Stone, H.L. The Commodity Futures Game. New York: McGraw-Hill, 1974

91. Thiessen, G.W. "An Analysis of the Cash Basis for Rapeseed at Vancouver." Unpublished Master of Science Thesis, University of Alberta, Edmonton, Alberta, Spring, 1970.

92. Tomek, W.G. A Note on Historical Wheat Prices and Futures Trading, Stanford University Food Research Institute Studies, 1971. Vol. 10, No. 1 p 109-113.

93. Tomek, W.G. "using Zero-One Variables with Time Series Data in Regression Equations." Journal of Farm Economics, XL (1963), p 313.

94. Tryfos, P. "The Determinants of Price and Employment in the Canadian Meat Industry." Canadian Journal of Agricultural Economics. Vol. 21, #2 (july, 1973), p 25-42.

95. United States Department of Agriculture. Canada: Growth Potential of the Grain and Livestock Sectors. Report No. 77. Washington, D.C.: Economic Research Service, USDA, June, 1972.

96. Ward, R.W., and Dasse, F.A. "Empirical Contribution to Basis Theory The Case of Citrus Futures." American Journal of Agricultural Economics, Vol. 59, #1, (Feb., 1977), p 71-80.

97. Wood, J.E. "Analysis of Potential Hedging Criteria for Live Hogs Using Seasonal Indices," American Journal of Agricultural Economics, Vol. 54, #5 (Dec. 1972), p 972-975.

98. Working, H. "Futures Markets under Renewed Attack." Food Research Institute Studies, Volume IV, No. 1 (1963), p 13-24.

99. Working, Holbrook. "Measurement of Cycles in Speculative Prices." Stanford University, Food Research Institute Studies, Vol. XIII No. 1, 1974, p 37-58

100. Working, Holbrook. Selected Writings of Holbrook Working. Edited by A. Peck, Chicago, Illinois: Chicago Board of Trade, 1977.

101. Working, H. "Speculation on Hedging Markets." Food Research Institute Studies, 1 (May, 1960), 185-220.

102. Working, H. "The Investigation of Economic Expectations." American Economics Review, XXXIX, No. 3 (May, 1949), p 150-66.

103. Yamey, B.S. "An Investigation of Hedging on an Organized Produce Exchange." The Manchester School of Economics and Social Studies XIX (September, 1951), p 305-19.

104. Yamey, B.S. "Short Hedging and Long Hedging in Futures Markets: Symmetry and Asymmetry." The Journal of Law and Economics, February, 1972, p 413.

APPENDIX A

TERMS COMMONLY USED IN FUTURES TRADING

actuals - the physical or cash commodity as distinguished from commodity futures contracts.

arbitrage - the simultaneous purchase of one commodity against the sale of another in order to profit from distortions from usual price relationships. Variations include simultaneous purchase and sale of different delivery months of the same commodity, of the same commodity and delivery month on two different exchanges, and the purchase of one commodity against the sale of another commodity. See also *spread*, *straddle*.

basis - (1) in the strict sense, the difference between the cash, or spot, price and the price of the nearby futures contract; (2) price basis - as in "price basis Thunder Bay": agreement between buyer and seller that the price for a transaction will be based upon the cash price at a given location, at a given time. Sometimes the work basis is used synonomously with "cash commodity", as in the phrases "long the basis" or "short the basis", meaning that one has bought or sold the cash commodity; (3) the grade of a commodity used as the standard of the commodity.

bear - one who believes price will decline.

broker - (1) a person paid a fee or commission for acting as an agent in making contracts or sales; (2) floor broker - in commodities futures trading, a person who actually executes orders on the trading floor of an exchange; (3) account executive - the person who deals with customers and their orders in commission house offices. See also registered commodity representative.

bull - one who expects prices to rise.

buying hedge (or long hedge) - buying futures contracts to protect against possible increased cost of commodities which will be needed in the future. See also hedging.

c.i.f. - cost, insurance, and freight paid to port of destination.

carrying charges - (1) those costs incurred in warehousing the physical commodity, generally including interest, insurance, and storage; (2) "full carrying charge market": a situation in the futures market when the price difference between delivery months reflects the full costs of interest, insurance, and storage.

carryover - that part of current supplies of a commodity comprised of stocks from previous production/marketing seasons.

cash commodity - actual stocks of a commodity as distinguished from futures contracts; goods available for immediate delivery or for delivery within a specified period following sale; or a commodity bought or sold with an agreement for delivery at a specified future date. See also actuals and forward contracting.

clearing house - an agency connnected with commodity exchanges through which all futures contracts are made, offset, or fulfilled through delivery of the actual commodity, and through which financial settlement is made; often is a fully chartered separate corporation, rather than a division of the exchange proper.

commission merchant - one who makes a trade either for another member of the exchange or for a non-member client, but who makes the trade in his own name and becomes liable as principal to the other party to the transaction.

Commodity Exchange Authority (CEA) - a regulatory agency of the U.S. Department of Agriculture set up to administer the Commodity Exchange Act, which supervises trading on commodity exchange regulated as contract markets.

contract grades - standards or grades of commodities listed in the rules of the exchanges which must be met when delivering cash commodities against futures contracts. Grades are often accompanied by a schedule of discounts and premiums allowable for delivery of commodities of lesser or greater quality than the contract grade.

corner - (1) to secure such relative control of a commodity or security that its price can be manipulated; (2) in the extreme, obtaining more contracts requiring the delivery of commodities or securities than the quantity of such commodities or securities actually in existence.

cover - to offset a previous futures transaction with an equal and opposite transaction. "Short-covering" is a purchase of futures contracts to cover an earlier sale of an equal number of the same delivery month; "liquidation" is the sale of futures contracts to offset the obligation to take delivery on an equal number of futures contracts of the same delivery month purchased earlier.

current delivery (month) - the futures contract which will come to maturity and become deliverable during the current month; also called "spot month".

day traders - commodity traders, generally members of the exchange active on the trading floor, who take positions in commodities and then liquidate them prior to the close of the same trading day.

deferred delivery - (1) synonomous with forward contracting; (2) the most distant months in which futures trading is taking place, as distinguished from the nearby futures delivery months.

deliverable grades - see contract grades.

delivery month - a calendar month during which a futures contract matures and becomes deliverable.

delivery notice - notice from the clearing house of a seller's intention to deliver the physical commodity against his short futures position; precedes and is distinct from the warehouse receipt or shipping certificate, which is the instrument of transfer of ownership.

delivery points - those locations designated by commodity exchanges at which stocks of a commodity represented by a futures contract may be delivered in fulfillment of the contract.

delivery price - the official settlement price of the trading session during which the buyer of futures contracts receives through the clearing house a notice of the seller's intention to deliver, and the price at which the buyer must pay for the commodities represented by the futures contract.

differentials - price differences between classes, grades, and locations of different stocks of the same commodity.

discount - (1) a downward adjustment in price allowed for delivery of stocks of a commodity of lesser than deliverable grade against a futures contract; (2) sometimes used to refer to the price differences between futures of different delivery months, as in the phrase "July at a discount to May", indicating that the price of the July future is lower than that of the May.

elasticity - a characteristic of commodities which describes the interaction of the supply, demand, and price of commodity; demand elasticity - a commodity is said to be elastic in demand when a price change creates an increase or decrease in consumption; supply elasticity - the supply of a commodity is said to be elastic when a change in price creates change in the production of the commodity; inelasticity of supply or of demand exists in either of the reverse situations, when either supply or demand is relatively unresponsive to changes in price.

f.o.b. - free on board: indicates that all delivery, inspection, and elevation or loading costs involved in putting commodities on board a carrier have been paid.

first notice day - first day on which notices of intention to deliver cash commodities against futures contracts can be presented by sellers and received by buyers through the exchange clearing house.

forward contracting - a cash transaction common in many industries, including commodity merchandising, in which the buyer and seller agree upon delivery of a specified quality and quantity of goods at a specified future date. A specific price may be agreed upon in advance, or there may be agreement that the price will be determined at the time of delivery on the basis of either the prevailing local cash price or a futures price.

hedging - briefly stated, the sale of futures contracts in anticipation of futures sales of cash commodities as a protection against possible price declines, or the purchase of futures contracts in anticipation of future purchases of cash commodities as a protection against the possibility of increasing costs. See also buying hedge, selling hedge.

inverted market - futures market in which the nearer months are selling at premiums over the more distant months; characteristically a market in which supplies are currently in shortage.

last trading day - day in which trading ceases for the maturing (current) delivery month.

life of contract - period between the beginning of trading in a particular future and the expiration of trading in the delivery month.

limit up or down - see price limit.

limit order - an order in which the customer sets a limit on either price or time of execution, or both, as contrasted with a "market order," which implies that the order should be filled at the most favorable price as soon as possible.

liquidation - see cover.

liquid market - a market where selling and buying can be accomplished with ease, because of the presence of a large number of interested buyers and sellers.

long - one who has bought a cash commodity or a commodity futures contract, in contrast to a short, who has sold a cash commodity or futures contract.

margin - (1) an amount of money deposited by both buyers and sellers of futures contracts to insure performance against the contract, i.e. to deliver or take delivery of the commodity (not an equity or down payment for the goods represented by the futures contract); (2) profit margin - the difference between the price which one pays for goods and the price at which the goods, or products of them, are resold.

margin call - a call from a brokerage firm to a customer to bring margin deposits back up to minimum levels required by exchange regulations; similarly, a request by the clearing house to a clearing member firm to make additional deposits to bring clearing margins back to minimum levels required by the clearing house rules.

market order - an order to buy or sell futures contracts which is to be filled at the best possible price and as soon as possible. In contrast to a limit order, which may specify requirements for price or time of execution. See also limit order.

maturity - period within which a futures contract can be settled by delivery of the actual commodity; the period between the first notice day and the last trading day of a commodity futures contract.

non par delivery point - a location designated by commodity exchanges at which stocks of a commodity represented by a futures contract may be delivered at an appropriate discount in fulfillment of a contract. See also par delivery point.

offer - an indication of willingness to sell at a given price; opposite of a bid.

offset - an indication of a purchase of futures through the sale of an equal number of contracts of the same delivery month, or the covering of a short sale of futures contract through the purchase of an equal number of contracts of the same delivery month. Either action transfers the obligation to make or take delivery of the actual commodity to other persons.

on track (or track country station) - a type of deferred delivery in which the price is set f.o.b. seller's location and the buyer agrees to pay freight costs to his destination.

open interest - the total number of futures contracts of a given commodity which have not yet been offset by opposite futures transactions nor fulfilled by delivery of the actual commodity the total number of open transactions, with each transaction having a buyer and a seller. It, therefore, refers to integrated purchase on sales and to their combined total.

open outcry - method of public auction for making bids and offers in the trading pits, or rings, of commodity exchanges.

original margin - term applied to the initial deposit of margin money required of clearing member firms by clearing house rules; parallel to the initial margin deposit required of customers by exchange regulations.

P & S (purchase and sale) statement - a statement sent by a commission house to a customer when his futures position has changed, showing tthe number of contracts involved, the prices at which the contracts were bought or sold, the gross profit or loss, the commission charges, and the net profit or loss on the transaction.

par delivery point - a location designated by commodity exchanges at which stocks of a commodity represented by a futures contract may be delivered without penalty in fulfillment of a contract. See also *non par delivery point*.

pit - a market commitment. A buyer of futures contracts is said to have a long position, and, conversely, a seller of futures contracts is said to have a short position.

position limit - the maximum number of futures contracts in certain regulated commodities that one can hold in accordance with the provisions of the Commodity Exchange Act in the United States.

position trader - a commodity trader who either buys or sells contracts and holds them for an extended period of time, as distinguished from the day trader, who will normally initiate and liquidate a futures position within a single trading session.

premium - (1) the additional payment allowed by exchange regulations for delivery of higher-than-required standards or grades of a commodity against a futures contract. In speaking of price relationships between different delivery months of a given commodity, one is said to be "trading at a premium" over another when its price is greater than that of the other.

price limit - maximum price advance or decline from the previous day settlement price permitted for a commodity in one trading session by the rules of the exchange.

pyramiding - the use of profits in existing futures positions as margins to increase the size of the position, normally in successively smaller increments; such as the use of profits on the purchase of five futures contracts as margin to purchase an additional four contracts, whose profits will in turn be used to margin an additional three contracts, etc.

reporting limit - sizes of positions set either by the exchanges or by the Commodity Exchange Authority at or above which commodity traders must make daily reports to either the exchange or the Commodity Exchange Authority, or both, as to the size of the position, by commodity, by delivery month, and according to the purpose of trading, i.e. speculative or hedging.

sample grade - in commodities, usually the lowest quality acceptable for delivery in satisfaction of futures contracts. See contract grades.

scalper - a speculator on the trading floor of an exchange who buys and sells rapidly, with small profits or losses, holding his positions for only a short time during a trading season. Typically, a scalper will stand ready to buy at a fraction below the last transaction price and to sell at a fraction above, thus creating market liquidity.

selling hedge (or short hedge) - selling futures contracts to protect against possible decreased prices of commodities which will be sold in the future. See also hedging.

short - one who has sold a cash commodity or a commodity futures contract, in contrast to a long, who has bought a cash commodity or futures contract.

speculator - one who attempts to anticipate commodity price changes and make profits through either the sale or purchase, or both, of commodity futures contracts. A speculator with a forecast of advancing prices hopes to profit by buying futures contracts and then liquidating his obligation to take delivery with a later sale of an equal number of futures of the same delivery month at a higher price. A speculator with a forecast of declining prices hopes to profit by selling commodity futures contracts and then covering his obligation to deliver with a later purchase of futures at a lower price.

spot commodity - see cash commodity

spread (or straddle) - the purchase of one futures delivery month against the sale of another futures delivery month of the same commodity, the purchase of one delivery month of one commodity against the sale of that same delivery month of a different commodity, or the purchase of one commodity in one market against the sale of that commodity in another market, to take advantage of and profit from the distortions from the normal price relationships that sometimes occur. See also arbitrage. The term "spread" is also used to refer to the difference between the price of one futures month and the price of another month of the same commodity.

street price - the net price paid for the truckload of grain delivered to an elevator.

switch - liquidation of a position in one delivery month of a commodity and simultaneous initiation of a similar position in another delivery month of the same commodity. When used by hedgers, this tactic is referred to as "rolling forward" the hedge.

ticker tape - a continuous paper tape transmission of commodity or security prices, volume, and other trading and market information which operates on private leased wires by the exchanges, available to their member firms and other interested parties on a subscription basis.

to-arrive contract - a type of deferred shipment in which the price is based on delivery at the destination point and the seller pays the freight in shipping it to that point.

trading limit - (1) maximum price change permitted for a single trading session; (2) maximum futures market position anyone is permitted to own or control under the law.

variation margin call - a mid-session call by the clearing house on a clearing member requiring the deposit of additional funds to bring clearing margin monies up to minimum levels in relation to changing prices and the clearing member's net position.

volume of trading - purchases and sales of a commodity future during a specified period.

warehouse receipts - document guaranteeing the existence and availability of a given quantity and quality of a commodity in storage; commonly used as the instrument of transfer of ownership in both cash and futures transactions.

Source: Storey, G.G., and Martin L. A Preliminary Paper on the Role and Importance of Futures Markets to Canadian Agriculture, Food Prices Review Board, Reference Paper No. 1.

APPENDIX B

CONTRACTS USED IN THIS STUDY

CHICAGO BOARD OF TRADE CORN	delivery months	March, May, July, September, and December.
	trading unit	5,000 bushels
	price quotations and minimum fluctuation	Quoted in cents and quarters of a cent per bushel, with a minimum fluctuation of ¼ cent per bushel ($12.50 per contract).
	daily price movement limits	Subject to change; consult latest official notices from the Exchange. Currently 10 cents per bushel.
	position limits	3 million bushels in any one future or in all futures combined.
	grades deliverable	No. 2 Yellow corn and substitutions at differential established by the Exchange.
	delivery	By registered warehouse receipts issued against stocks in warehouses that have been declared regular by the Exchange, located in the Chicago Switching District, the Toledo, Oh. Switching District, and the St. Lous, MO. Switching District (which includes East St. Louis, IL). Deliveries at Toledo and St. Louis are made at a discount of 4 cents per bushel under the (Chicago) contract price.
	trading hours	9:30 a.m. to 1:15 p.m. Central Time.

CHICAGO MERCANTILE EXCHANGE LIVE BEEF CATTLE	delivery months	As determined by the Exchange (currently January, February, April, June, August, October and December)
	trading unit	40,000 pounds
	minimum fluctuation	.025 cents per pound (1¢/lb. = $400/contract).
	daily price movement limits	Subject to change; consult latest official notices from the Exchange. Currently 1½¢/lb.
	daily trading limits	450 contracts
	position limits	300 contracts in any one month.
	standards	Choice grade; according to the USDA official U.S. Standards for Grades of Slaughter cattle with substitutions and allowances as established by the Exchange.
	delivery	From approved livestock yards in Omaha, NB, Sioux City, IA, and Peoria, IL., and from approved livestock yards elsewhere with allowances established by the Exchange.
	trading hours	9:05 a.m. to 12:45 p.m. Central Time.

CHICAGO MERCANTILE EXCHANGE FEEDER CATTLE	delivery months	As determined by the Exchange (currently January, March, April, May, August, September, October, and November)
	trading unit	42,000 pounds.
	minimum fluctuation	.025 cents per pound (1¢/lb = $420/contract).
	daily price movement limits	Subject to change; consult latest official notices from the Exchange. Currently 1½¢/lb.
	daily trading limits	450 contracts.
	position limits	300 contracts in any one month.
	standards	Feeder steers of the Choice, or better, and Good grades as defined in the "Official U.S. Standards for Grades of Feeder Cattle."
	delivery	From approved livestock yards in Omaha, NB, or Sioux City, IA, and from approved livestock yards elsewhere with allowances established by the Exchange.
	trading hours	9:05 a.m. to 12:45 p.m. Central Time.

SOURCE: Chicago Board of Trade Commodity Trading Manual, Chicago Illinois: 1976.

2

APPENDIX C

PROFIT AND LOSS FROM FEEDLOT OPERATION AND FROM HEDGES

Feeding Period Starting (T-17)	Week #	Total Net Return From Feedlot	Profit (Loss) Corn Hedge	Profit (Loss) Feeder Cattle Hedge	Profit (Loss) Live Cattle Hedge
		$ Canadian per Head			
		1	2	3	4
Dec. 29/75	992	66.90	(20.29)	20.07	(59.44)
Jan. 5/76	993	44.79	(15.50)	9.44	(37.02)
Jan. 12/76	994	55.68	(20.62)	5.21	(25.94)
Jan. 19/76	995	62.35	(18.10)	2.80	(21.36)
Jan. 26/76	996	57.01	(20.42)	6.38	(39.27)
Feb. 2/76	997	56.27	(26.29)	26.84	(32.18)
Feb. 9/76	998	57.87	(14.61)	51.60	(21.48)
Feb. 16/76	999	48.78	(10.62)	48.52	(8.45)
Feb. 23/76	1000	37.02	(6.61)	33.43	0.89
Mar. 1/76	1001	31.43	(4.89)	22.98	13.00
Mar. 8/76	1002	43.10	(1.97)	22.56	29.48
Mar. 15/76	1003	32.68	(1.36)	7.79	21.71
Mar. 22/76	1004	37.08	(6.03)	11.01	25.88
Mar. 29/76	1005	46.66	(7.17)	9.85	27.11
Apr. 5/76	1006	48.93	(2.53)	31.97	45.89
Apr. 12/76	1007	72.35	(1.49)	49.95	31.19
Apr. 19/76	1008	60.52	(0.70)	67.04	42.40
Apr. 26/76	1009	63.21	1.00	58.04	42.15
May 3/76	1010	68.33	(0.17)	48.51	49.90
May 10/76	1011	65.52	1.44	36.27	42.82
May 17/76	1012	45.73	0.09	32.21	53.91
May 24/76	1013	61.24	8.32	40.06	77.23
May 31/76	1014	56.14	7.56	32.10	84.40
June 7/76	1015	44.94	12.08	22.92	76.49
June 14/76	1016	53.87	6.53	15.79	50.19
June 21/76	1017	40.87	6.49	7.78	34.42
June 28/76	1018	49.93	6.04	(1.43)	37.37
July 5/76	1019	35.37	10.15	(14.97)	46.10
July 12/76	1020	44.61	12.47	(6.75)	47.16

Feeding Period Starting (T-17)	Week #	Total Net Return From Feedlot	Profit (Loss) Corn Hedge	Profit (Loss) Feeder Cattle Hedge	Profit (Loss) Live Cattle Hedge
		$ Canadian per Head			
		1	2	3	4
July 19/76	1021	37.55	7.92	(3.48)	41.76
July 26/76	1022	30.41	6.67	(19.39)	41.18
Aug. 2/76	1023	34.72	4.09	(37.45)	25.28
Aug. 9/76	1024	67.18	3.20	(31.86)	36.76
Aug. 16/76	1025	47.17	4.04	(33.59)	44.85
Aug. 23/76	1026	70.08	7.17	(29.55)	34.51
Aug. 30/76	1027	75.52	8.58	(39.33)	25.90
Sept. 6/76	1028	77.31	12.02	(48.26)	33.98
Sept. 13/76	1029	68.19	9.92	(52.00)	42.79
Sept. 20/76	1030	85.10	2.72	(67.52)	22.32
Sept. 27/76	1031	75.16	(1.99)	(74.38)	3.66
Oct. 4/76	1032	59.96	(6.31)	(56.13)	17.66
Oct. 11/76	1033	83.69	(5.20)	(32.66)	35.50
Oct. 18/76	1034	100.02	(9.04)	(22.41)	39.13
Oct. 25/76	1035	9.424	(10.37)	(13.13)	36.85
Nov. 1/76	1036	96.65	(15.84)	16.84	33.83
Nov. 8/76	1037	97.53	(20.42)	17.38	18.45
Nov. 15/76	1038	99.72	(18.45)	(21.91)	(2.37)
Nov. 22/76	1039	88.72	(11.39)	(25.39)	(2.90)
Nov. 29/76	1040	88.25	(13.73)	(15.30)	7.32
Dec. 6/76	1041	82.50	(11.34)	(23.52)	(6.48)
Dec. 12/76	1042	65.28	(14.49)	(30.07)	(29.65)
Dec. 20/76	1043	67.86	(17.21)	(28.53)	(37.74)
Dec. 27/76	1044	83.90	(16.51)	(22.33)	(41.01)
Jan. 3/77	1045	57.35	(20.32)	(15.97)	(47.32)
Jan. 10/77	1046	49.44	(14.56)	(12.20)	(34.14)
Jan. 17/77	1047	61.93	(11.27)	9.06	(22.87)
Jan. 24/77	1048	52.14	(8.96)	2.72	2.79
Jan. 31/77	1049	33.08	(12.31)	9.01	(2.37)
Feb. 7/77	1050	35.22	(8.97)	(10.90)	19.65
Feb. 14/77	1051	30.29	(7.55)	(12.03)	30.17
Feb. 21/77	1052	31.69	(3.44)	(19.75)	1.73
Feb. 28/77	1053	33.18	(2.89)	(18.09)	(4.98)
Mar. 7/77	1054	47.43	2.86	(11.38)	14.24
Mar. 14/77	1055	53.56	4.26	7.01	29.35

Feeding Period Starting (T-17)	Week #	Total Net Return From Feedlot	Profit (Loss) Corn Hedge	Profit (Loss) Feeder Cattle Hedge	Profit (Loss) Live Cattle Hedge
		$ Canadian per Head			
		1	2	3	4
Mar. 21/77	1056	50.02	1.12	16.18	30.46
Mar. 28/77	1057	49.29	0.94	10.61	45.56
Apr. 4/77	1058	53.08	(3.47)	14.64	63.22
Apr. 11/77	1059	43.36	0.19	25.75	66.03
Apr. 18/77	1060	60.21	0.37	31.72	67.34
Apr. 25/77	1061	68.15	(6.66)	30.58	53.88
May 2/77	1062	64.95	(9.68)	27.05	48.06
May 9/77	1063	63.43	(14.10)	21.10	33.70
May 16/77	1064	53.40	(13.82)	15.07	28.55
May 23/77	1065	58.57	(10.45)	2.20	33.13
May 30/77	1066	62.60	(6.84)	1.55	24.26
June 6/77	1067	51.53	(11.17)	(13.23)	2.11
June 13/77	1068	82.05	(17.49)	(19.33)	(9.10)
June 20/77	1069	86.03	(20.25)	0.07	(3.84)
June 27/77	1070	80.76	(18.60)	5.71	(14.43)
July 4/77	1071	91.42	(20.00)	(3.68)	(12.02)
July 11/77	1072	84.33	(23.74)	(13.57)	(10.77)
July 18/77	1073	77.56	(26.96)	(13.95)	(26.44)
July 25/77	1074	86.24	(28.93)	(14.67)	(23.62)
Aug. 1/77	1075	87.25	(29.77)	(25.14)	(33.31)
Aug. 8/77	1076	88.23	(33.65)	(28.46)	(44.21)
Aug. 15/77	1077	82.13	(36.50)	(34.21)	(57.55)
Aug. 22/77	1078	80.87	(30.98)	(25.60)	(65.93)
Aug. 29/77	1079	80.43	(28.67)	(20.96)	(55.61)
Sept. 5/77	1080	95.26	(23.76)	(19.02)	(46.08)
Sept. 12/77	1081	112.64	(22.10)	(18.80)	(39.65)
Sept. 19/77	1082	100.39	(21.51)	(13.52)	(38.63)
Sept. 26/77	1083	92.06	(24.77)	(11.42)	(25.71)
Oct. 3/77	1084	105.58	(18.65)	0.68	(55.20)
Oct. 10/77	1085	124.23	(15.29)	5.54	(68.68)
Oct. 17/77	1086	129.91	(12.67)	(8.59)	(83.63)
Oct. 24/77	1087	140.81	(11.76)	(12.97)	(75.17)
Oct. 31/77	1088	119.92	(7.79)	(16.54)	(85.94)
Nov. 7/77	1089	113.61	(1.08)	(14.37)	(119.50)
Nov. 14/77	1090	122.60	3.50	(4.58)	(140.95)

Feeding Period Starting (T-17)	Week #	Total Net Return From Feedlot	Profit (Loss) Corn Hedge	Profit (Loss) Feeder Cattle Hedge	Profit (Loss) Live Cattle Hedge
		$ Canadian per Head			
		1	2	3	4
Nov. 21/77	1091	112.05	6.47	(2.95)	(111.88)
Nov. 28/77	1092	116.80	7.44	8.15	(121.89)
Dec. 5/77	1093	97.63	6.99	13.76	(104.62)
Dec. 12/77	1094	87.57	9.95	21.90	(119.04)
Dec. 19/77	1095	89.75	12.36	24.07	(117.73)
Dec. 26/77	1096	88.41	11.77	29.73	(112.85)
Jan. 2/78	1097	88.56	7.49	30.48	(131.96)
Jan. 9/78	1098	80.77	7.23	28.62	(154.50)
Jan. 16/78	1099	84.47	4.37	30.94	(180.90)
Jan. 23/78	1100	71.73	7.44	36.22	(183.68)
Jan. 30/78	1101	62.13	3.79	50.84	(145.70)
Feb. 6/78	1102	57.86	4.99	61.34	(113.06)
Feb. 13/78	1103	57.90	5.56	75.19	(73.11)
Feb. 20/78	1104	51.82	3.47	68.27	(55.02)
Feb. 27/78	1105	72.87	(0.30)	77.60	(28.17)
Mar. 6/78	1106	72.10	1.75	107.93	(53.82)
Mar. 13/78	1107	85.22	5.15	108.10	(43.53)
Mar. 20/78	1108	94.55	8.22	89.88	(19.07)
Mar. 27/78	1109	121.13	11.77	93.12	(27.62)
Apr. 3/78	1110	106.76	15.08	79.87	(13.96)
Apr. 10/78	1111	113.90	18.93	85.63	9.17
Apr. 17/78	1112	129.89	15.48	87.19	15.48
Apr. 24/78	1113	150.17	(0.35)	91.38	(0.35)
May 1/78	1114	118.40	(5.18)	110.09	(5.18)
May 8/78	1115	150.06	(8.98)	121.65	(8.98)
May 15/78	1116	183.23	(0.24)	141.78	(0.24)
May 22/78	1117	153.56	33.34	156.04	33.34

VITA

JOHN PETER CALDWELL

ADDRESS

Present Address
Apt. 402
1815-111 A. Street
Edmonton, Alberta
Phone: Res: (403) 437-7433
Bus: (403) 428-0236

Permanent Address
R.R. #2
Almonte, Ontario
Phone: (603) 256-2305

Date of Birth: November 29.1950
Marital Status: Single
Health: Excellent

Education

Candidate for Certified General Accountant
Fall, 1981. Specialization: Financial Management

Candidate for Master of Science.
University of Alberta, Edmonton, Alberta, Spring 1981.
Specialization: Agricultural Economics
Major Areas: Marketing and Agricultural Business
Minor Areas: Natural Resources Economics
Thesis Subject: Hedging on the United States Futures Market by a Canadian Producer.

Bachelor of Commerce
Carleton University, Ottawa, Ontario, Spring 1975
Specialization: Accounting and Finance.

TRAINING

Toastmaster, 1979.
Dale Carnegie, "Effective Public Speaking" 1976

BUSINESS EXPERIENCE

August, 1980 - present
Agrologist, Bank of Nova Scotia, Alberta North.
Duties: Develop and implement a marketing strategy to increase the agribusiness clientele of the Bank of Nova Scotia. Analyze financial statements and evaluate the financial performance of companies engaged in agribusiness. Prepare and submit reports with recommendations to regional and general office concerning the credit worthiness of loan applications. In co-operation with the Personnel Department identify agriculture oriented branches and assist in the selection of personnel to staff such branches. Provide consultation to existing customers on their business and financial needs. Provide consultation to Branch Managers on agriculture in general. Represent the Bank of Nova Scotia at agricultural functions.

March 1978 - August 1980
Assistant Manager/Credit Assistant/Credit Trainee
Bank of Nova Scotia.
Duties: Analyze financial statements and evaluate the financial performance of companies. Evaluate and authorize loans for a complete portfolio of farm, business, and corporate accounts. Supervise and train credit assistants and credit trainees. Prepare and submit reports with recommendations to regional and general offices concerning the credit worthiness of loan applications. Monitor accounts on a daily basis to determine if loan conditions are being honoured. Provide consultation and advice to customers on financial matters.

June 1975 - September 1976.
Assistant Economic Analyst.
Economics Branch, Agriculture Canada.
Reported to Dr. B. Perkins.
Duties: Prepared financial budgets, cash flows, and financial forecasts for the Canadian Dairy Commission. Develop and implement computer programs to provide up-to-date analysis of cash flows and financial forecasts. Analyze, evaluate and prepare briefs on agricultural policy issues.

January 1971 - September 1971
Computer Programmer,
Federal Department of Transport
Duties: Write and test computer programs according to specification.

JOHN CALDWELL

November, 1980